Philips Consumer Electronics Company
A Division of North American Philips Corporation

MANUAL 6561
Magnavox Models:
6CM321954I
7CM321954I
7CM329954I

Technical Service Data

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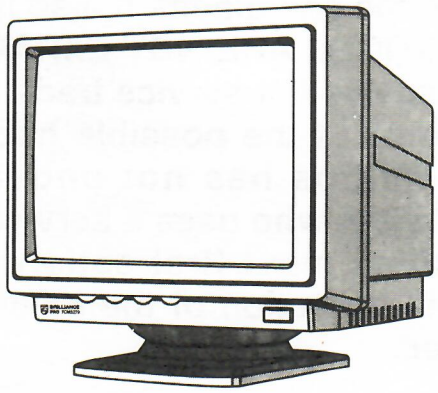
MANUAL 6561 (MODELS: 6CM321954I, 7CM321954I, 7CM329954I)

6CM321954I S-VGA/60 COLOR MONITOR
7CM321954I S-VGA TRIPLE MODE COLOR MONITOR
7CM329954I S-VGA TRIPLE MODE LOW EMISSION COLOR MONITOR



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REFER TO BACK COVER FOR SAFETY GUIDELINES

SAFETY NOTICE

ANY PERSON ATTEMPTING TO SERVICE THIS CHASSIS MUST FAMILIARIZE HIMSELF WITH THE CHASSIS AND BE AWARE OF THE NECESSARY SAFETY PRECAUTIONS TO BE USED WHEN SERVICING ELECTRONIC EQUIPMENT CONTAINING HIGH VOLTAGES.

CAUTION

USE A SEPARATE ISOLATION TRANSFORMER FOR THIS UNIT WHEN SERVICING.

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IMPORTANT SAFETY NOTICE

Proper service and repair is important to the safe, reliable operation of all Philips Consumer Electronics Company Equipment. The service procedures recommended by Philips and described in this service manual are effective methods of performing service operations. Some of these service operations require the use of tools specially designed for the purpose. The special tools should be used when and as recommended.**

It is important to note that this manual contains various CAUTIONS and NOTICES which should be carefully read in order to minimize the risk of personal injury to service personnel. The possibility exists that improper service methods may damage the equipment. It also is important to understand that these CAUTIONS and NOTICES ARE NOT EXHAUSTIVE. Philips could not possibly know, evaluate and advise the service trade of all conceivable ways in which service might be done or of the possible hazardous consequences of each way. Consequently, Philips has not undertaken any such broad evaluation. Accordingly, a servicer who uses a service procedure or tool which is not recommended by Philips must first satisfy himself thoroughly that neither his safety nor the safe operation of the equipment will be jeopardized by the service method selected.

** Hereafter throughout this manual, Philips Consumer Electronics Company will be referred to as Philips.**

WARNING

Critical components having special safety characteristics are identified with a ⚠ by the Ref. No. in the parts list and enclosed within a broken line* (where several critical components are grouped in one area) along with the safety symbol ⚠ on the schematics or exploded views.

Use of substitute replacement parts which do not have the same specified safety characteristics may create shock, fire, or other hazards.

Under no circumstances should the original design be modified or altered without written permission from Philips. Philips assumes no liability, express or implied, arising out of any unauthorized modification of design. Servicer assumes all liability.

*** Broken Line** — · — · — · —

TECHNICAL DATA (subject to modification)

General

– a.c. voltage	98-132V
– a.c. frequency	60Hz
– power consumption	80 W (normal) 100 W (max.)
– weight	13kg
– width	356 mm
– depth	395 mm
– height	320 mm

Picture tube

– size	14"
– deflection angle	90°
– High voltage	24KV
– pitch	0.28 mm

Video

– vertical frequency	50-87 Hz
– horizontal frequency	31.47/35.2/35.5 kHz (catch in range 600 Hz)
– resolution	640 dots x 350 lines (70Hz) 640 dots x 400 lines (70Hz) 640 dots x 480 lines (60Hz) 640 dots x 600 lines (60Hz), (6CM3219/3299) 800 dots x 600 lines (56Hz), (7CM3219/3299)

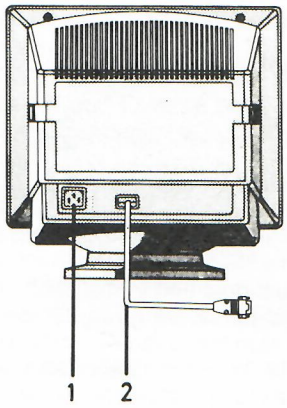
Safety regulations require that the set be restored to its original condition and that parts which are identical with those specified be used.

REMARKS

The direct voltages and waveforms are average values. They have been measured under the following conditions.
Signal pattern: cross hatch
Controls: mid-position

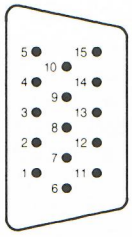
CONNECTIONS AND CONTROLS

1. A. C. VOLTAGE CONNECTOR
2. "D" SHELL INTERFACE CABLE



INPUT - OUTPUT SIGNALS

M301
15 PIN "D"-SHELL CONNECTOR



PIN	SIGNAL	SENSITIVITY	TERMINAL IMPEDANCE
1	RED VIDEO INPUT	RGB ANALOG 0-0.7Vpp lineair	75Ω
2	GREEN VIDEO INPUT		
3	BLUE VIDEO INPUT		
4	IDENT OUTPUT (CONNECTED TO PIN 10)		
5	SELF-TEST INPUT		
6	RED VIDEO GROUND		
7	GREEN VIDEO GROUND		
8	BLUE VIDEO GROUND		
9	N.C. (NO PIN)		
10	LOGIC GROUND		
11	IDENT OUTPUT (CONNECTED TO PIN 10)		
12	IDENT OUTPUT (N.C.)		
13	HORIZONTAL SYNC	TTL LEVEL L = 0-0.8V H = 2.4-5V	2.2kΩ (PULL DOWN)
14	VERTICAL SYNC		
15	N.C. (NOT CONNECTED)		

SYNC POLARITIES		
RESOLUTION	H	V
640 x 350	+	−
640 x 400	−	+
640 x 480	−	−
800 x 600	+	+

CAUTION

1) Safety requirements stipulate that, during repair, the set should be restored to its original state and that parts identical to the specified ones should be installed.
2) For safety reasons, the parts indicated with the sign ⚠ should be replaced by identical parts (for code numbers see electrical parts lists).
3) To avoid damage to ICs and transistors, flash-over of the high-tension should be avoided.
4) Be careful when performing measurements in the high-tension section and on the picture tube.
5) Never change parts when the set is still switched on.
6) Safety goggles must be worn during replacement of the picture tube.
7) The picture tube must be discharged as shown in Fig. 1.

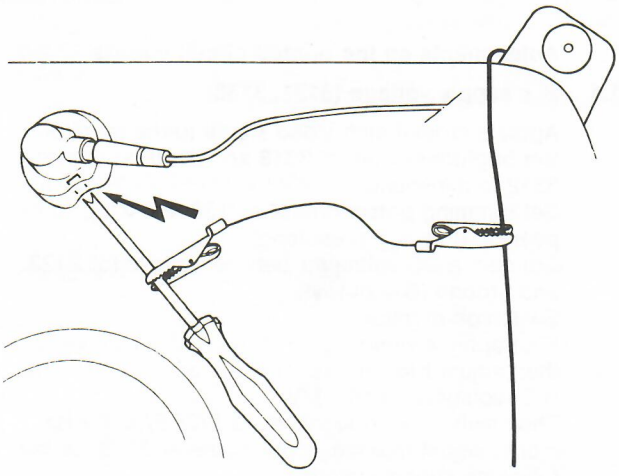


Fig. 1

Servicing hints

To be able to perform measurements and repairs on the main printed circuit board, you should first place it in the service position.
The connection between interface cable and the video board should then be extended by means of an extension cable 4822 321 61254.
The power connection may be made in one of the following ways:
1. Dismount the EMI panel and put it aside the main panel.
2. Connect the cable from the power socket directly to the connector M105 on the main panel.
3. Use some of the extension cables (A) of set 4822 321 60582

WARNING ESD

All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD).
Careless handling during repair can reduce life drastically.
When repairing, make sure that you are connected with the same potential as the mass of the set via a wrist wrap with resistance.
Keep components and tools also at this potential.

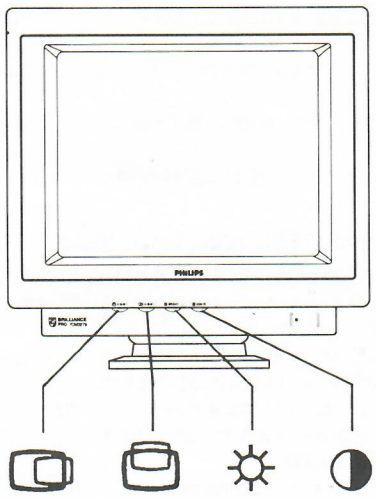


Fig. 2

ELECTRICAL ADJUSTMENTS

1. Adjustments on the printed circuit boards

1.1 B + supply voltage (3131, 3138)

Apply a cross-hatch video signal to the monitor.
Set brightness control 3318 and contrast control 3312 to minimum.
Set trimming potentiometers 3138 and 3131 to mid. position (this is a presetting).
Connect a DC voltmeter between capacitor 2123 and ground (B + output).
Switch on monitor.
First apply a video signal in the 31.5 KHz mode, then adjust trimming potentiometer 3131 until the D.C. voltmeter reads 87V.
Then switch video signal to 35.2/35.5/37.8 KHz mode, adjust trimming potentiometer 3138 for the following supply voltages:
a) monitor with 35.2 KHz mode ..... 99V ± 0.5V
b) monitor with 35.5 KHz mode ..... 99.2V ± 0.5V
c) monitor with 37.8 KHz mode .....108.2V ± 0.5V

1.2 Horizontal synchronization (3425, 3421)

Apply a cross-hatch video signal to the monitor.
Short the junction of resistor 3423 and capacitor 2410 to ground.
First apply a video signal in the 31.5 KHz mode, then adjust trimming potentiometer 3425 until the picture is straight.
Then switch video signal to 35.2/35.5/37.8 KHz mode, adjust trimming potentiometer 3421 until the picture is straight.
Remove the short-circuit (to ground) at the junction of resistor 3423 and capacitor 2410.

1.3 Picture geometry settings

General:
- Load the SUPER VGA test program (software) in the computer.
- Select the CROSSHATCH test signal, unless otherwise stated.
- Pre-set the external H-shift and V-shift controls to their mechanical mid-position.

1.3.1 Horizontal picture centering (3452, 3413, 3922)

Select the VGA mode (640x480) of the test software.
Adjust R3452 for correct centering of the whole raster.
Adjust R3413 for correct centering of the video signal.
Select SUPER VGA mode 800x600/35.2 or 1024x768/35.5 kHz.
Adjust R3922 for correct centering of the video display.

1.3.2 Vertical height (3539, 3926, 3537, 3923)

Select the VGA mode (640x480) of the test software.
Adjust R3539 for a picture height of 180 mm.
Select the VGA mode (640x400) of the test software.
Adjust R3926 for a picture height of 180 mm.
Select the VGA mode (640x350) of the test software.
Adjust R3537 for a picture height of 180 mm.
Select the SUPER VGA mode 800x600/35.2 or 1024x768/35.5 KHz.
Adjust R3923 for a picture height of 180 mm.

1.3.3 Picture width (3553,3925)

Select the VGA mode (640x480) of the test software.
Adjust R3553 for a picture height of 240 mm.
Select the SUPER VGA mode 800x600/35.2 or 1024x768/35.5 KHz.
Adjust R3925 for a picture height of 240 mm.

1.3.4 East-west pincushion correction (3544,3924)

Select the VGA mode (640x480) of the test software.
Adjust R3544 until the vertical lines on the left- and right-hand sides of the screen edges are as straight as possible.
Select the SUPER VGA mode 800x600/35.2 or 1024x768/35.5 kHz.
Adjust R3924 until the vertical lines on the left- and right-hand sides of the screen edges are as straight as possible.

1.3.5 Vertical picture centering (3524)

Select the VGA mode (640x480) of the test software. Adjust external control 3524 (pre-set at detent position) for correct vertical centering of the video display.

1.4 VG2 (bottom knob on the line output transformer Cut-off points of the picture tube (3373, 3376, 3379) White "D" (3321, 3324, 3327, 3316)

(The color temperature of white "D" is 6500°K)
Pre-set potentiometers 3321, 3324, 3327, 3379, 3376 and 3373 to mid-position.
Apply a video signal (full-white) in the 31.5 KHz mode (480 lines).
Set brightness control 3318 to detent position and contrast control 3312 and sub-contrast potentiometer 3316 to minimum.
Set VG2 potentiometer to minimum.
Adjust VG2 potentiometer to increase VG2 voltage until any color among red, green and blue becomes "just visible".
Then adjust the potentiometers of the "two remaining" colors (3373, 3376 and 3379) to the same light output level, so that an optimal background (raster) color is obtained.
Adjust brightness control 3318 to maximum to double check the background (raster) color. Then return it to detent position.
Set sub-contrast potentiometer 3316 to mid-position and contrast control 3312 to detent position
Adjust potentiometers 3321, 3324 and 3327 to the same light output level so that an optimal display color (white-D) is obtained.
If necessary, adjust sub-contrast potentiometer 3316 for optimal light output of the video display.
Adjust contrast control 3312 to maximum to double check the displayed color.

1.5 Focussing (top knob on line output transformer)

Apply a video signal ("M" characters) in the 31.5 KHz mode (480 lines).
Set brightness control 3318 to detent position.
Set contrast control 3312 to maximum.
Adjust focus potentiometer so that the picture at 2/3 of the diagonal lines (from center to four corners) of the displayed screen is as sharp as possible.

1.6 Pulse duration mono multivibrator (3819)

Select the VGA mode (640x480) of the test software.
Connect an oscilloscope to pin7 of IC7801.
Adjust R3819 for a time BETWEEN two pulses of 30 ± 0.3µsec.

2. Picture Settings

Remarks:

The following adjustments only apply to monitors which are fitted with a replaceable deflection unit.
In case of combi tube replacement, no picture settings are required because it has already been done by the factory.
The color purity and convergence adjustments described hereafter need only be carried out if a completely new setting is required or if a new picture tube has been fitted. In other cases, for example after replacing the deflection unit, it will not usually be necessary to remove the rubber wedges (G in figure 3). Corrections by means of the multi-pole unit will then suffice.
Focusing adjustment described in item 1.5 must be done prior to picture settings.

2.1 Color purity, see figure 3

Unscrew the fixing screw "F" on the deflection unit.
Move the deflection unit and remove the three rubber wedges "G".
Move the deflection unit forward as far as possible against the glass of the picture tube cone and tighten fixing screw "F" so that the deflection unit can only be shifted slightly.
Place the multi-pole unit in the position drawn: tighten screw "A" and turn locking ring "B" counterclockwise.
Position the monitor to face east or west and switch it on. Apply a cross-hatch pattern and set the brightness control to maximum. Allow the monitor to warm up for ten minutes.
Adjust the static convergence using tags "C" and "D" (if necessary, refer to point 2.2.).
Turn 3524 for the vertical centering to its mid-position.
Switch off the green and blue guns by removing the corresponding cable connections to the CRT PANEL.
By turning the color purity rings with the "E" tags, the vertical red bar is brought as close as possible to the center of the screen, while the central horizontal line should be as straight as possible.
Apply a white pattern signal and check that the red bar is in fact in the center of the screen. If not, switch on the cross-hatch pattern again and move the red bar in the right direction, ensuring that the picture does not move too much in the vertical direction.
Apply the white pattern signal and move the deflection unit until the whole picture surface is uniformly red.
Switch on the green and blue guns. There may be no color patches in the white picture now obtained. If there are, a minor correction can be made by turning the color purity rings "E" slightly and/or moving the deflection unit slightly.
Tighten screw "F" securely.
Adjust the vertical centering with 3524.
Proceed to the static and then the dynamic convergence setting.

2.2 Static convergence, see figure 3

Apply a cross-hatch pattern and allow the monitor to warm up for ten minutes.
Switch off the green gun by removing the corresponding cable connection to the CRT PANEL and turn locking ring "B" counterclockwise.
By turning the four-pole rings with the "C" tags the red and blue cross-hatch patterns are placed on top of each other in the center of the screen.
Switch on the green gun by mounting the corresponding cable to the CRT PANEL in its original position again and switch off the blue gun by removing the corresponding cable connection to the CRT PANEL.
By turning the six-pole rings with the "D" tags, the red and green patterns are placed on top of each other in the center of the screen.
Switch on the blue gun by mounting the corresponding cable connection to the CRT PANEL back to its original position and tighten ring "B".

2.3 Dynamic convergence

Remark:
The dynamic convergence is achieved by tilting the deflection unit vertically and horizontally. In order to fix the deflection unit in the right position, three rubber wedges are fitted between the glass of the picture tube cone and the deflection unit, as shown in fig. 4d or 5d.
Two wedge thicknesses are available, one 7 mm thick, code number 4822 462 40356 and the other 11 mm thick, code number 4822 462 40357.
First check the color purity and the static convergence.
Apply a cross-hatch pattern and switch off the green gun by removing the corresponding cable connection to the CRT PANEL.
Eliminate the crossing of the central horizontal blue and red line and the crossing of the central vertical blue and red line by vertically tilting the deflection unit. If the deflection unit is in the correct position, then place rubber wedge (1), without removing the paper strip, at the top (figure 4a) or at the bottom (figure 5a).
Figure 4a applies when the unit is tilted upwards and figure 5a applies when the unit is tilted downwards.
Through the horizontal tilting of the deflection unit, both the horizontal blue and red lines in the upper and lower halves of the picture and the vertical blue and red lines on the left and right-hand side of the picture are placed on top of each other.
If the deflection unit is in the correct position, then place wedges (2) and (3), remove the paper strips and firmly press the adhesive side of these wedges against the glass of the picture tube as shown in figure 4b or 5b.
Now place wedge (4) as shown in figure 4c or 5c, remove the paper strip and firmly press the adhesive side of this wedge against the glass of the picture tube cone.
Remove wedge (1) so that the situation according to figure 4d or 5d arises.
Switch on the green gun by mounting the corresponding cable connection to the CRT PANEL in its original position again.

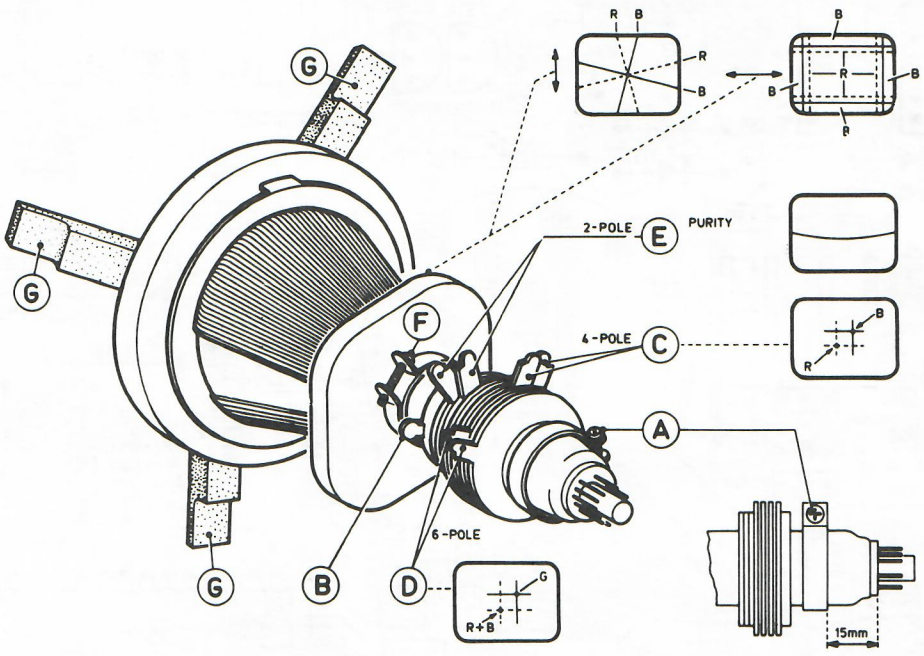


Fig. 3

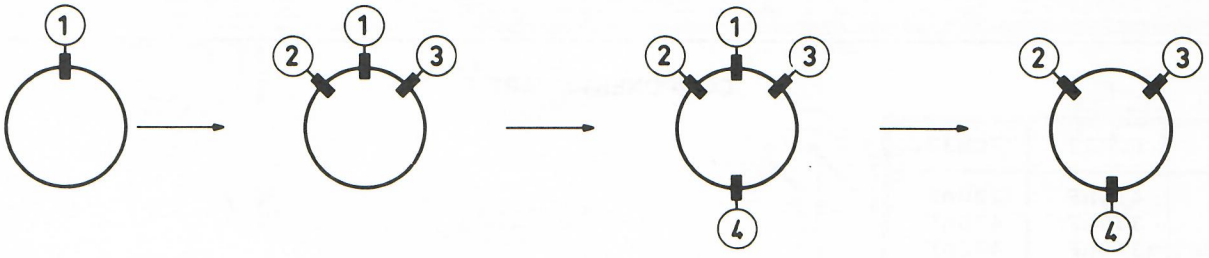


Fig. 4a Fig. 4b Fig. 4c Fig. 4d

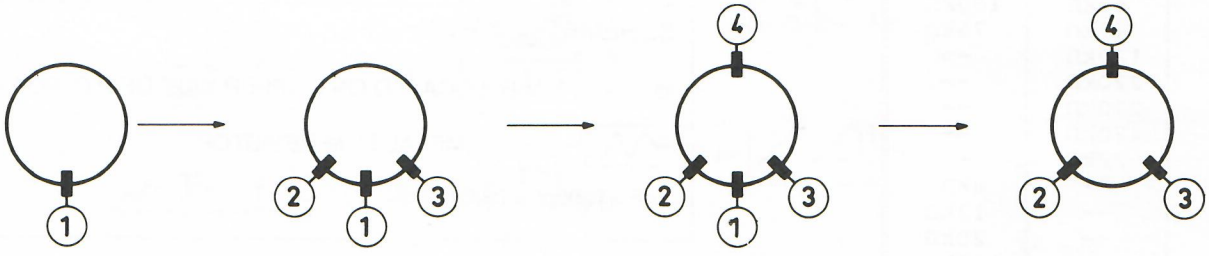
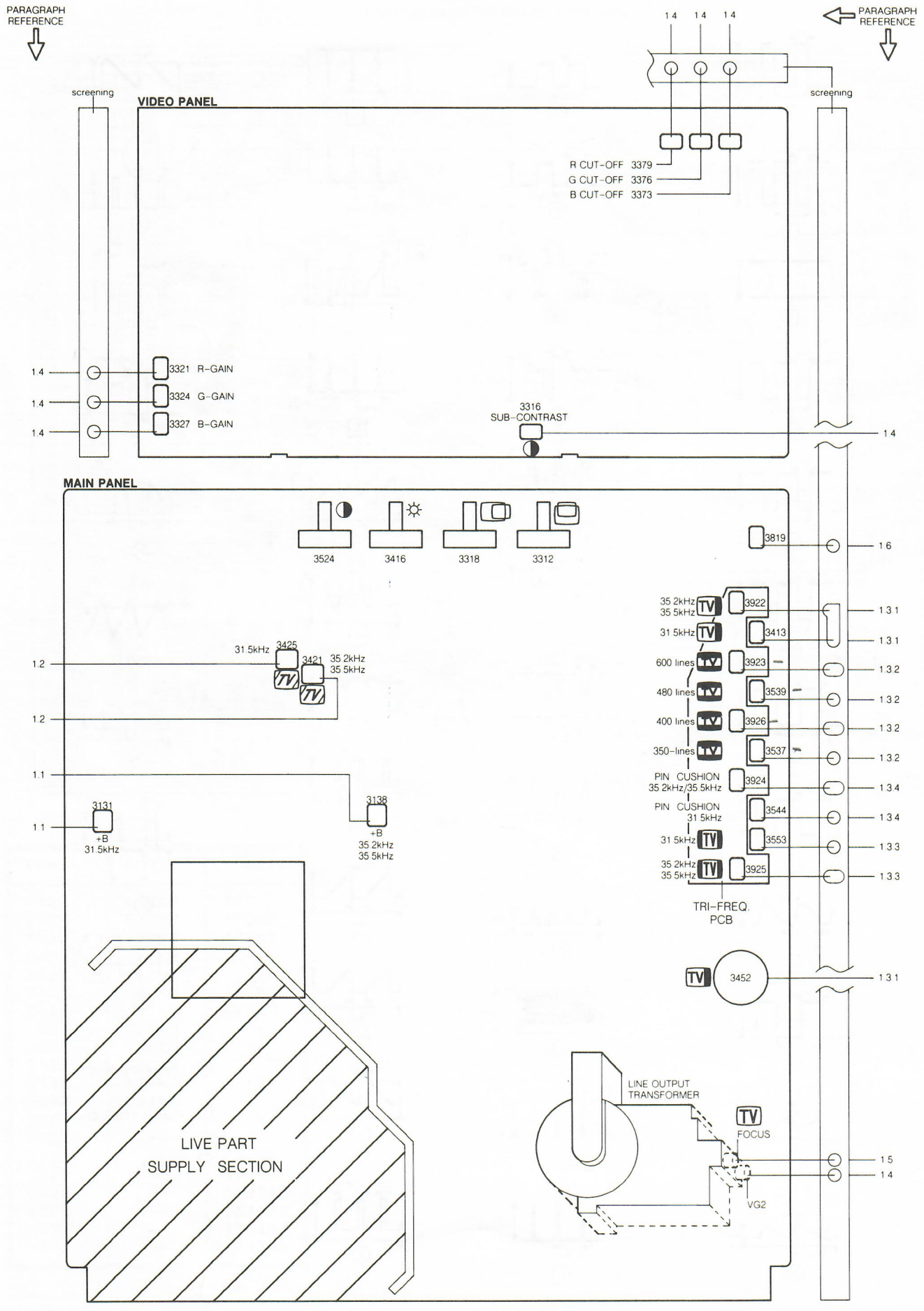
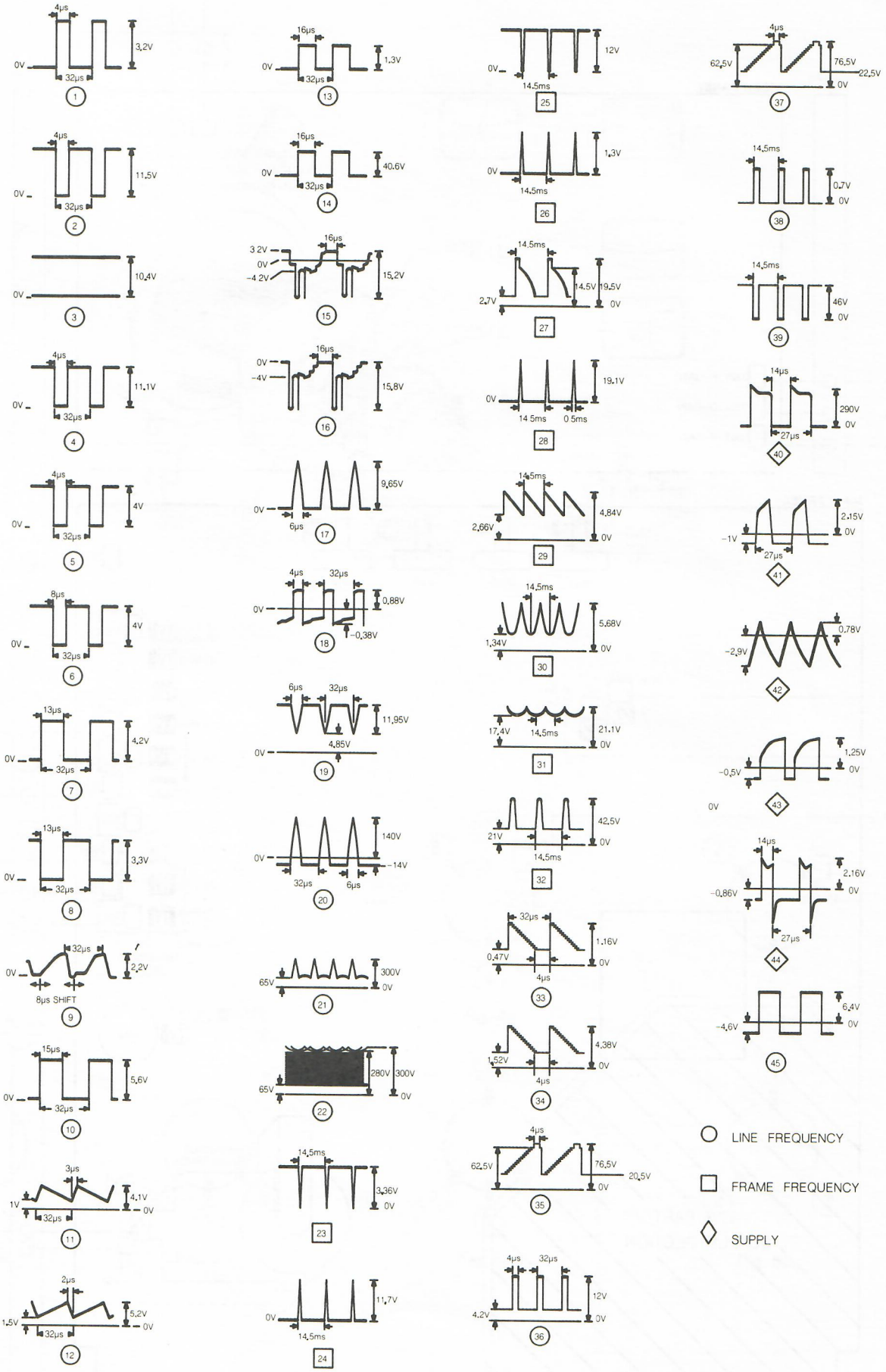


Fig. 5a Fig. 5b Fig. 5c Fig. 5d

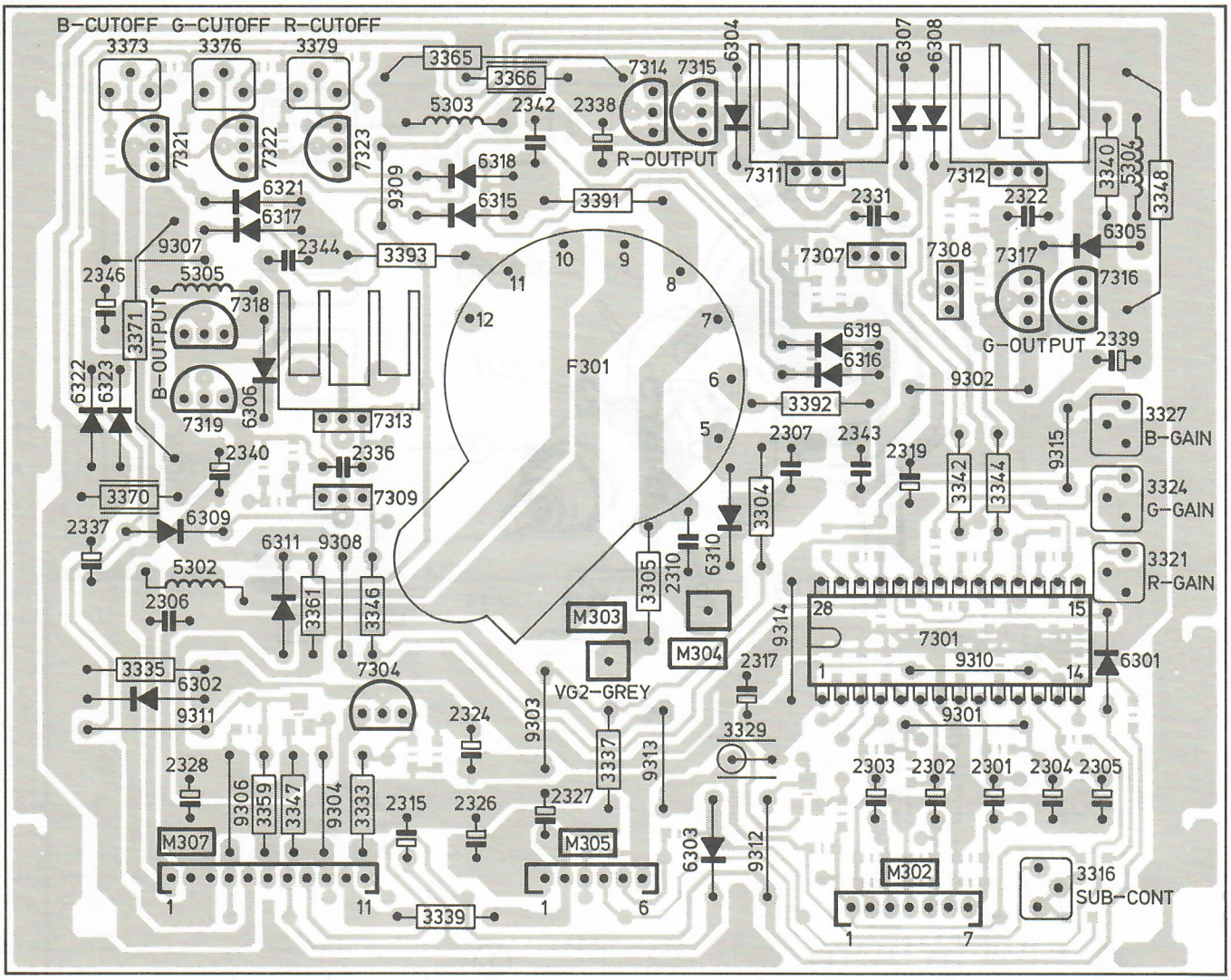
LOCATION OF ADJUSTING COMPONENTS



WAVEFORMS


4µs
3,2V
0V
32µs
1
4µs
11,5V
0V
32µs
2
10,4V
0V
3
4µs
11,1V
0V
32µs
4
4µs
4V
0V
32µs
5
8µs
4V
0V
32µs
6
13µs
4,2V
0V
32µs
7
13µs
3,3V
0V
32µs
8
32µs
2,2V
0V
8µs SHIFT
9
15µs
5,6V
0V
32µs
10
3µs
4,1V
1V
32µs
0V
11
2µs
5,2V
1,5V
32µs
0V
12
16µs
1,3V
0V
32µs
13
16µs
40,6V
0V
32µs
14
16µs
3,2V
0V
-4,2V
15,2V
15
16µs
0V
-4V
15,8V
16
9,65V
0V
6µs
17
4µs
32µs
0,88V
0V
-0,38V
18
6µs
32µs
11,95V
4,85V
0V
19
140V
0V
-14V
32µs
6µs
20
65V
300V
0V
21
65V
280V
300V
0V
22
14,5ms
3,36V
0V
23
0V
11,7V
14,5ms
24
12V
0V
14,5ms
25
1,3V
0V
14,5ms
26
14,5ms
2,7V
14,5V
19,5V
0V
27
19,1V
0V
14,5ms
0,5ms
28
14,5ms
4,84V
2,66V
0V
29
14,5ms
5,68V
1,34V
0V
30
17,4V
14,5ms
21,1V
0V
31
42,5V
21V
0V
14,5ms
32
32µs
1,16V
0,47V
0V
4µs
33
4,38V
1,52V
0V
4µs
34
4µs
62,5V
76,5V
20,5V
0V
35
4µs
32µs
12V
4,2V
0V
36
4µs
62,5V
76,5V
22,5V
0V
37
14,5ms
0,7V
0V
38
14,5ms
46V
0V
39
14µs
290V
0V
27µs
40
2,15V
-1V
0V
27µs
41
0,78V
-2,9V
42
1,25V
-0,5V
0V
0V
43
14µs
2,16V
-0,86V
0V
27µs
44
6,4V
-4,6V
0V
45
LINE FREQUENCY
FRAME FREQUENCY
SUPPLY

VIDEO PC BOARD
(viewed from the component side)

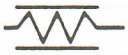


COMPONENT CHART

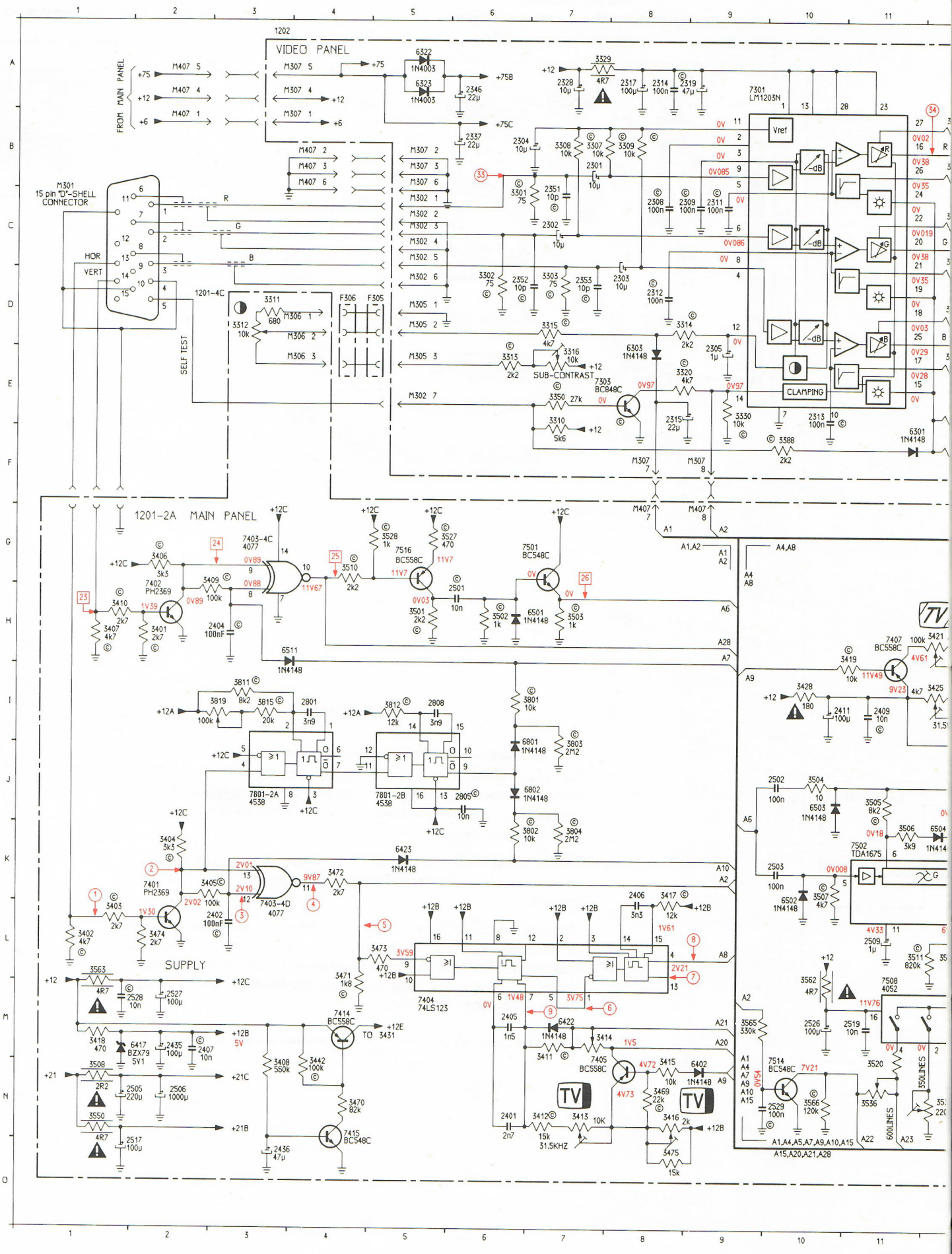
Pos.	6CM32..	7CM32..
2425	470nF	220nF
2427	330nF	470nF
2429	330nF	470nF
3411	27kΩ	--
3414	47kΩ	---
3421	47kΩ	100kΩ
3422	47kΩ	75kΩ
3520	120kΩ	--
3536	220kΩ	--
3538	220kΩ	--
3546	470kΩ	--
3558	22kΩ	--
3811	--	8k2
3812	--	12kΩ
3815	--	20kΩ
3819	--	100kΩ
6422	--	1N4148
6801	--	1N4148
6802	--	1N4148
7801	--	HEF4538

SCHEMATIC NOTES:

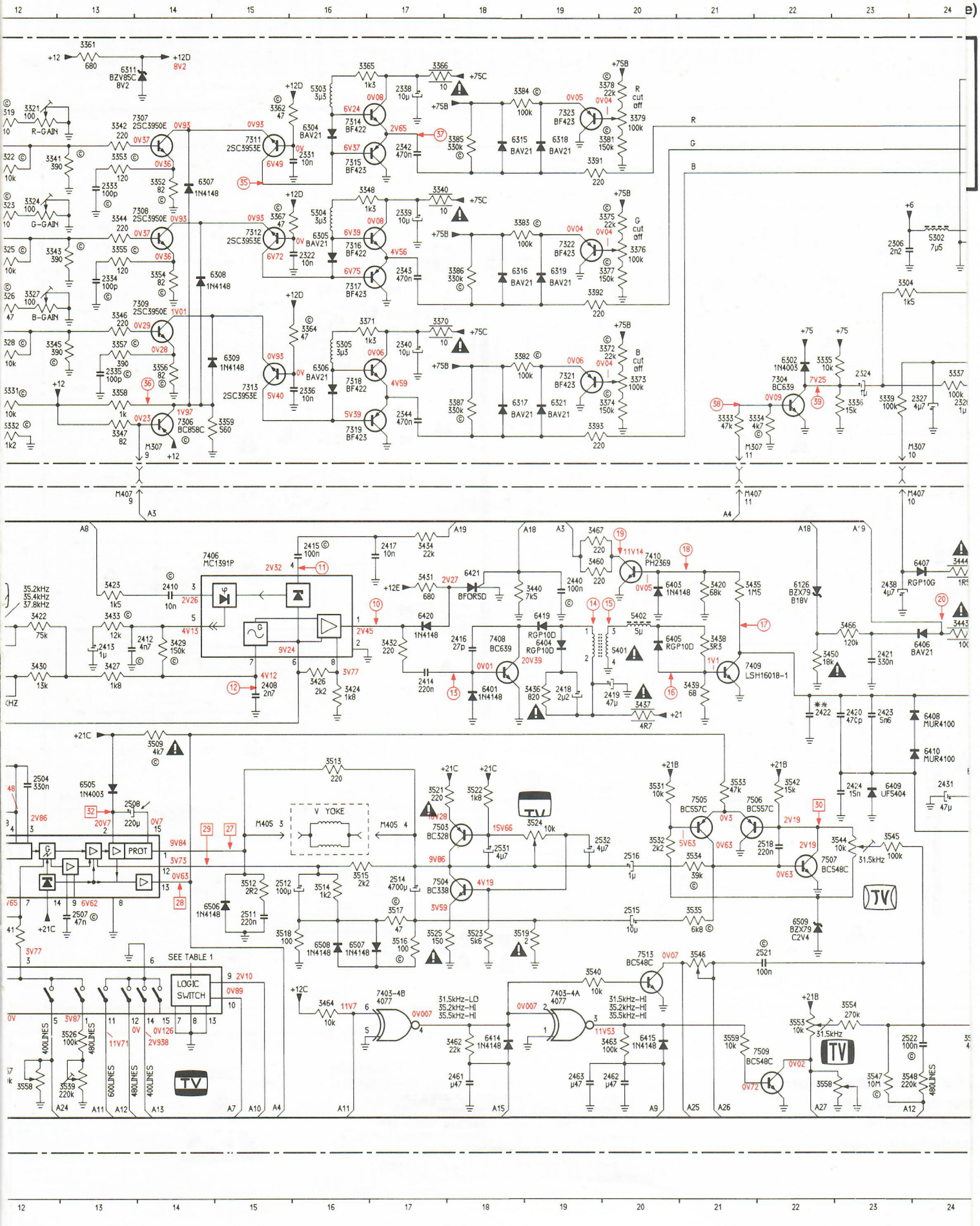
© - S.M.D. LOCATED ON COPPER SIDE OF P.C. BOARD

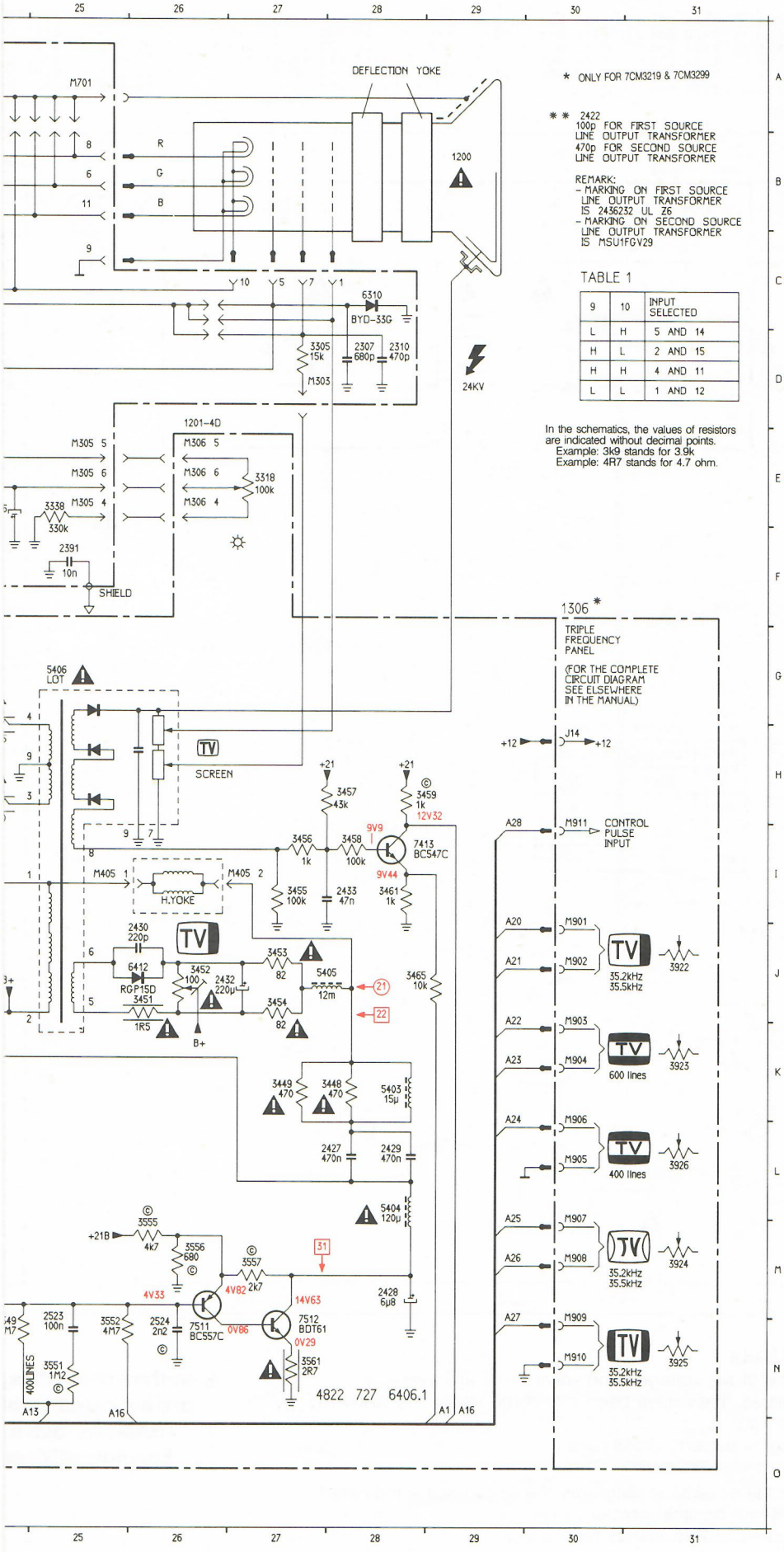
 - METAL FILM RESISTOR

1nF =1000pf = 0.001uF


VIDEO PANEL
1202
FROM MAIN PANEL
M301
15 pin "D"-SHELL CONNECTOR
HOR
VERT
SELF TEST
SUB-CONTRAST
CLAMPING
7301 LM1203N
1201-2A MAIN PANEL
SUPPLY
7403-4C 4077
7403-4D 4077
7516 BC558C
7501 BC548C
7401 PH2369
7402 PH2369
7801-2A 4538
7801-2B 4538
7404 74LS123
7414 BC558C
7415 BC548C
7405 BC558C
7407 BC558C
7514 BC548C
7502 TDA1675
7303 BC848C
TO 3431
600LINES
350LINES
TV

SIGNAL PROCESSING SCHEMATIC DIAGRAM





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1202 A3	3342 B13	3539 N13	7802 J5
2301 B7	3343 C12	3540 M19	1201- D2
2302 C7	3344 C13	3541 L12	1201- E26
2303 D8	3345 E12	3542 J22	1201- G2
2304 B6	3346 D13	3544 K23	31.5k N22
2305 E9	3347 F13	3545 K23	7403- G3
2306 C23	3348 C17	3546 N21	7403- L3
2307 D28	3350 E7	3547 N23	7403- M17
2308 C8	3352 C14	3548 N23	7403- M19
2309 C8	3353 B13	3549 N24	
2310 D28	3354 D14	3550 N1	
2311 C9	3355 C13	3551 N25	
2312 D8	3356 E14	3552 N25	
2313 E10	3357 E13	3553 M22	
2314 A8	3358 E13	3554 M25	
2315 E8	3359 F15	3555 M26	
2317 A8	3361 A13	3556 M26	
2319 A8	3362 B15	3557 M27	
2322 C16	3364 D16	3558 N12	
2324 E23	3365 A17	3558 N22	
2326 E24	3366 A17	3559 N21	
2327 E24	3367 C15	3561 N27	
2328 A7	3370 D17	3562 L10	
2331 B16	3371 D17	3563 L1	
2333 C13	3372 E20	3565 M9	
2334 D13	3373 E20	3566 N10	
2335 E13	3374 E20	3801 I7	
2336 E16	3375 C20	3802 K7	
2337 B6	3376 C20	3803 J7	
2338 A17	3377 D20	3804 K7	
2339 C17	3378 A20	3811 I3	
2340 E17	3379 B20	3812 I5	
2342 B17	3381 B20	3815 I3	
2343 D17	3382 E19	3819 I3	
2344 F17	3383 C19	3922 K31	
2346 A6	3384 A19	3923 K31	
2351 C7	3385 B18	3924 M31	
2352 D6	3386 D18	3925 N31	
2353 D7	3387 E18	3926 L31	
2391 F25	3388 F10	5302 C24	
2401 N6	3391 B19	5303 A16	
2402 L3	3392 D19	5304 C16	
2404 H3	3393 F19	5305 E16	
2405 M6	3401 H2	5401 I20	
2406 K8	3402 L1	5402 H20	
2407 M2	3403 L1	5403 K28	
2408 I15	3404 K2	5404 L28	
2409 I11	3405 K3	5405 J28	
2410 H14	3406 G2	5406 G25	
2411 I10	3407 H1	6126 H22	
2412 H14	3408 N3	6301 F11	
2413 I13	3409 H3	6302 E22	
2414 I17	3410 H1	6303 E8	
2415 G16	3411 M7	6304 B16	
2416 H18	3412 N7	6305 C16	
2417 G17	3413 N7	6306 E16	
2418 I19	3414 M8	6307 C14	
2419 I20	3415 N8	6308 D15	
2420 I23	3416 N8	6309 E15	
2421 I23	3417 K8	6310 C28	
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2423 I23	3419 H11	6315 B18	
2424 J23	3420 H21	6316 D18	
2427 L28	3421 H12	6317 E18	
2428 M28	3422 H12	6318 B19	
2429 L28	3423 H13	6319 D19	
2430 J26	3424 I16	6321 E19	
2431 J24	3425 I12	6322 A5	
2432 J26	3426 I16	6323 A5	
2433 I28	3427 I13	6401 I18	
2435 M2	3428 I10	6402 N9	
2436 O3	3429 H14	6403 H20	
2438 H23	3430 I12	6404 H19	
2440 H19	3431 H17	6405 H20	
2461 N18	3432 H17	6406 I24	
2462 N20	3433 H13	6407 G24	
2463 N19	3434 G17	6408 I24	
2501 H6	3435 H21	6409 J23	
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2507 L13	3442 N4	6419 H19	
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2512 L15	3449 K27	6423 K5	
2514 L17	3450 I22	6501 H7	
2515 L20	3451 J26	6502 K10	
2516 K20	3453 J27	6503 J10	
2517 O2	3454 J27	6504 K12	
2518 K22	3455 I27	6505 J13	
2519 M11	3456 I27	6506 L14	
2521 L22	3457 H28	6507 L16	
2522 N23	3458 I28	6508 I28	
2523 N25	3459 H29	6509 L22	
2524 N26	3460 G19	6511 H4	
2526 M10	3461 I28	6801 J7	
2527 M2	3462 N18	6802 J7	
2528 M2	3463 N20	7301 A9	
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2532 K20	3466 H23	7306 F14	
2801 I4	3467 G19	7307 B13	
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2808 I5	3470 N4	7309 D13	
3301 C6	3471 L4	7311 B15	
3302 D6	3472 K4	7312 C15	
3303 D7	3473 L5	7313 E15	
3304 D23	3474 L2	7314 B16	
3305 D27	3475 Q8	7315 B16	
3307 B7	3501 H5	7316 C16	
3308 B7	3502 H6	7317 D16	
3309 B8	3503 H7	7318 E16	
3310 E7	3504 J10	7319 F16	
3311 D3	3505 J11	7321 E19	
3312 D3	3506 K11	7322 C19	
3313 E6	3507 K10	7323 B19	
3314 D8	3508 N1	7401 K2	
3315 D7	3509 J14	7402 H2	
3316 E7	3510 G4	7404 M5	
3318 E27	3511 L11	7405 N8	
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3320 E8	3513 J16	7407 H11	
3321 B12	3514 L16	7408 H18	
3322 B12	3515 K16	7409 I21	
3323 C12	3516 L17	7410 G20	
3324 C12	3517 L17	7413 I28	
3325 C12	3518 L15	7414 M4	
3326 D12	3519 L18	7415 N4	
3327 D12	3520 N11	7501 G6	
3328 E12	3521 J17	7502 K11	
3329 A7	3522 J18	7503 K18	
3330 E9	3523 L18	7504 L18	
3331 E12	3525 L17	7505 K21	
3332 F12	3526 N13	7506 K21	
3333 F21	3527 G6	7507 K22	
3334 F22	3528 G5	7508 L11	
3335 E22	3531 J20	7509 N22	
3336 E23	3532 K20	7511 N26	
3337 E24	3533 J21	7512 N27	
3338 E25	3534 K21	7513 M20	
3339 E23	3535 L21	7514 N10	
3340 C17	3536 N11	7516 G5	

1201-A9 1205 G19 1206 A3 1208 A2 2102 H14 2103 H14
2104 D10 2108 D12 2109 C13 2111 H11 2112 D13 2113 E10
2114 H13 2115 G13 2116 D11 2117 H10 2121 C15 2122 C16
2123 C16 2125 D15 2126 E17 2127 F15 2128 F15 2129 F15
2131 G15 2132 G17 2133 E15 2134 E15 2135 I 15 2136 H15
2137 F17 2140 D16 2183 B5 2186 B6 2188 B6
3101 D11 3103 C12 3104 D12 3105 C13 3106 D10
3107 F12 3108 F13 3109 F13 3110 E13 3111 H13 3112 F10
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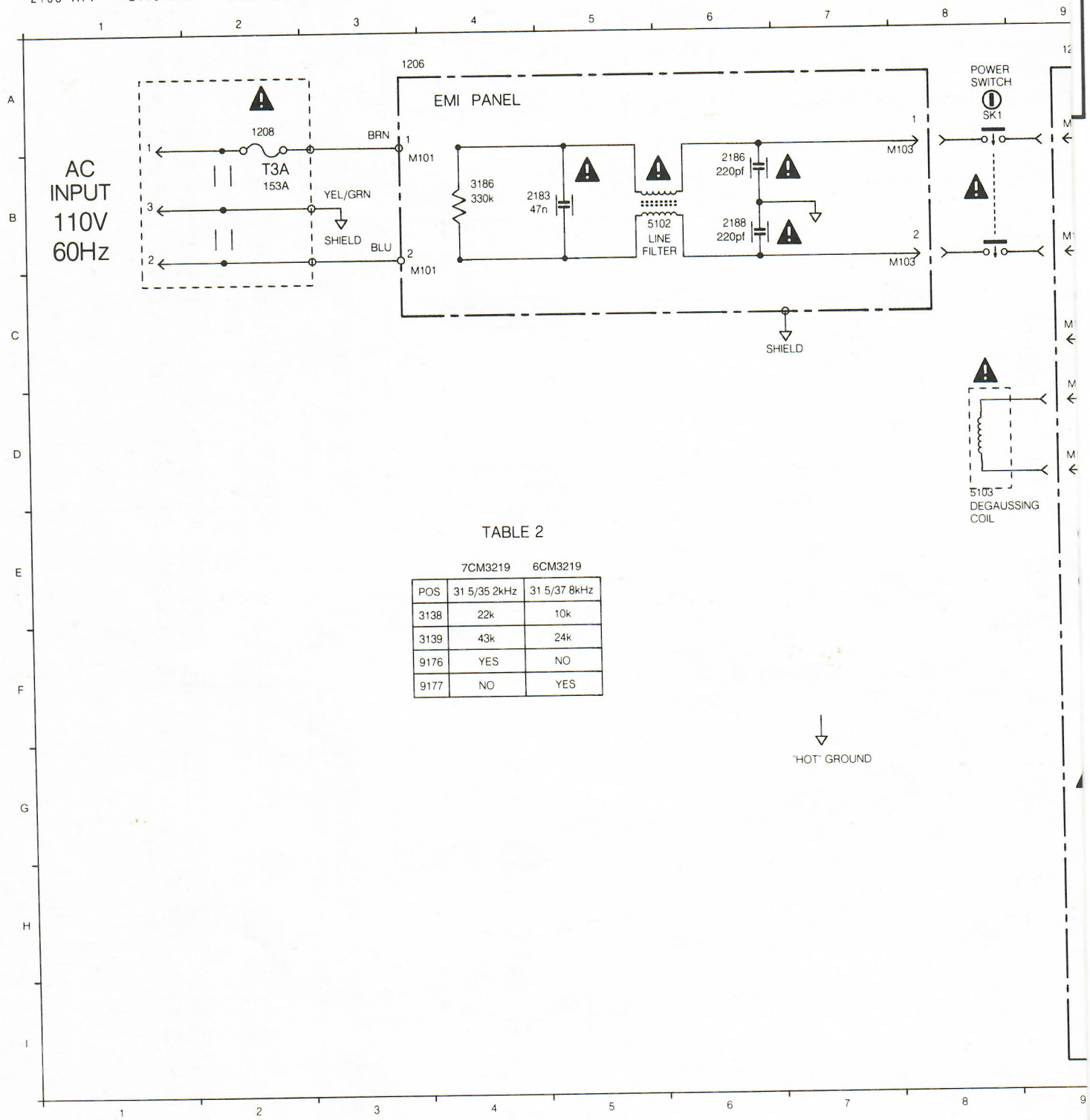


TABLE 2

	7CM3219	6CM3219
POS	31 5/35 2kHz	31 5/37 8kHz
3138	22k	10k
3139	43k	24k
9176	YES	NO
9177	NO	YES

REMARKS

- The direct voltages and waveforms are average values. They have been measured under the following conditions.
  Signal pattern: cross hatch
  Controls: mid-position
- In the schematic diagrams the voltages are indicated without decimal points.
  Example: 2V5 stands for 2.5 Volt.

In the schematics,
are indicated with
Example: 3k9 st
Example: 4R7 st

6561-15

POWER SUPPLY SCHEMATIC DIAGRAM

E11	3126 G15	3135 D15	3150 C10	5101 B14	5124 E16	6106 D13	6114 G11	6124 C16	6131 D15	7102 F11	7108 G11	9177 C14
C15	3127 I15	3136 H16	3151 H12	5102 B6	6101 B11	6107 D13	6115 G12	6125 D15	6132 E16	7103 G14	7121 C16	SK1 A8
C15	3129 H17	3137 D16	3152 F12	5103 D8	6102 C11	6108 E9	6116 H11	6127 E15	6134 F16	7104 F17	7122 D15	
D16	3130 F16	3138 F16	3153 E12	5104 E11	6103 C10	6109 E12	6117 E12	6128 D15	6135 E16	7105 H12	7123 D17	
C17	3131 I16	3139 F16	3154 E10	5121 B17	6104 B11	6110 E9	6121 B15	6129 F15	6137 G19	7106 E12	7125 H15	
E17	3132 H17	3141 G17	3186 B4	5123 C17	6105 G10	6111 F10	6122 B15	6130 I16	7101 D13	7107 F12	9176 C14	

9 10 11 12 13 14 15 16 17 18

1201-2B

POWER SUPPLY (PART OF MAIN PANEL)

POWER SWITCH SK1

M105 1

M105 2

P123

M105 3

M102 1

M102 2

5103 DEGAUSSING COIL

6104 6101 RECTIFIER 6103 6102

3102 NTC

3101 DOUBLE PTC

2104 47n

3103 390k

3104 390k

3105 22k

2109 47n

2116 100n

2108 330µ

6106

6107

133 68AC

40 7101 SWITCH

2112 220p

0V31

43 41

3106 68

3154 82

6108

6110

2113 100n

3120 24

5104 10µF

0V31 7106 SWITCH

3153 20k

6117

0V34

6109

3110 2R

42

0V26

0V99

0V

3152 27

7102 SWITCH

7107 SWITCH

3107 R43

3108 R43

3109 R43

45 X FORMER PART OF 5101

3112 2k7

3113 1k

3114 2k

6111 6V2

6114

3155 27

6105

44 0V33 7108 DRIVER

0V12

3117 1k

6115

2117 470µ

2111 470µ

0V83

3151 33

3115 47

0V37 7105 DRIVER

0V84

3119 5R6

6116

3118 1k

2114 1µ

3111 470

2115 15n

1V01

4

5

3V77

7103 OPTOCOUPLER

2102 4n7

2103 4n7

5101 POWER X FORMER

8 9 10 11 12 13 16 14 15

9177

9176

SEE TABLE 2

6121

6122

2121 330pf

95V16

87V52

7121 VOLTAGE REGULATOR

3121 3k3

94V27

6124

3122 22k

2122 100p

2123 100µ

5121 180µ

B+

+87 (31 5kHz)
+99 (35 2kHz)
+99 2 (35 5kHz)
+108 2 (37 8kHz)

5123 100µ

+75

3124 100k

7123 THYRISTOR

76V08

A15 MODE-SW

3135 22k

3137 15k

6125

6128

94V56

2125 100µ

0V

3123 22k

7122 SWITCH

2140 10n

6131

2134 220p

2133 1000µ

6132

6135

24V

+6

2126 22µ

3125 1k

6127

2127 220p

2128 470µ

5124 100µ

+21

SEE TABLE 2
35 2kHz
37 8kHz

2137 47µ

3138 22k

B+

43k

3139

6134 BAV21

6129

2129 220p

2131 1500µF

SUPPLY VOLTAGE ADJ

3130 1R5

7104 STABILIZER 12V

15V02

14V75

+12

2132 100µ

13V75

3126 390

3141 1k5

M104 1

P104 1

M104 2

P104 2

3136 2k7

3129 13k

12V67

6V80

7125 ERROR LATCH

6V15

2136 10n

3132 2k2

3131 470

(31 5KHZ) B+

SUPPLY VOLTAGE ADJ

2135 47µ

3127 4k3

6130 6V2

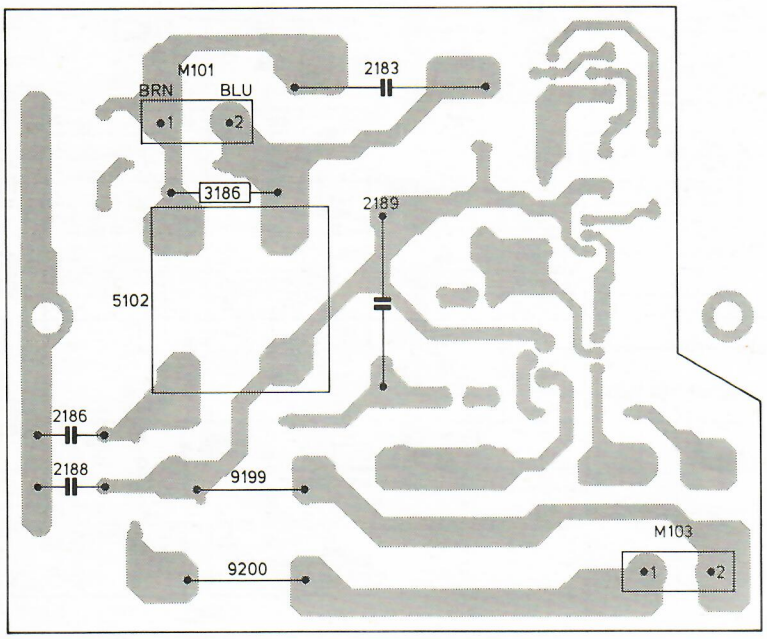
schematics, the values of resistors
icated without decimal points.
nple: 3k9 stands for 3.9k.
nple: 4R7 stands for 4.7 ohm.

WARNING

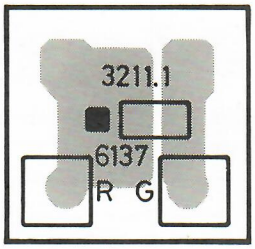
All ICs and many other semiconductors are susceptible to electrostatic discharges (ESD). Careless handling during repair can reduce life drastically.
When repairing, make sure that you are connected with the same potential as the mass of the set via a wrist wrap with resistance. Keep components and tools also at this potential.

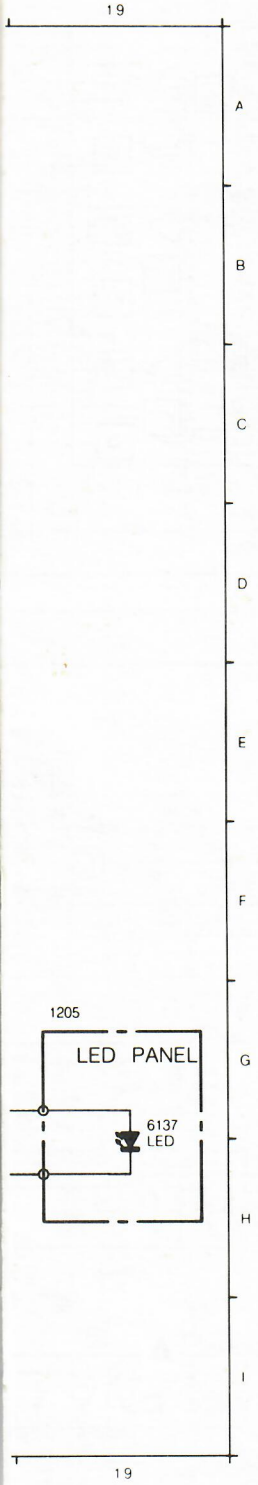
ESD

EMI PC BOARD
(viewed from the component side)



LED PC BOARD
(viewed from the component side)





WARNING

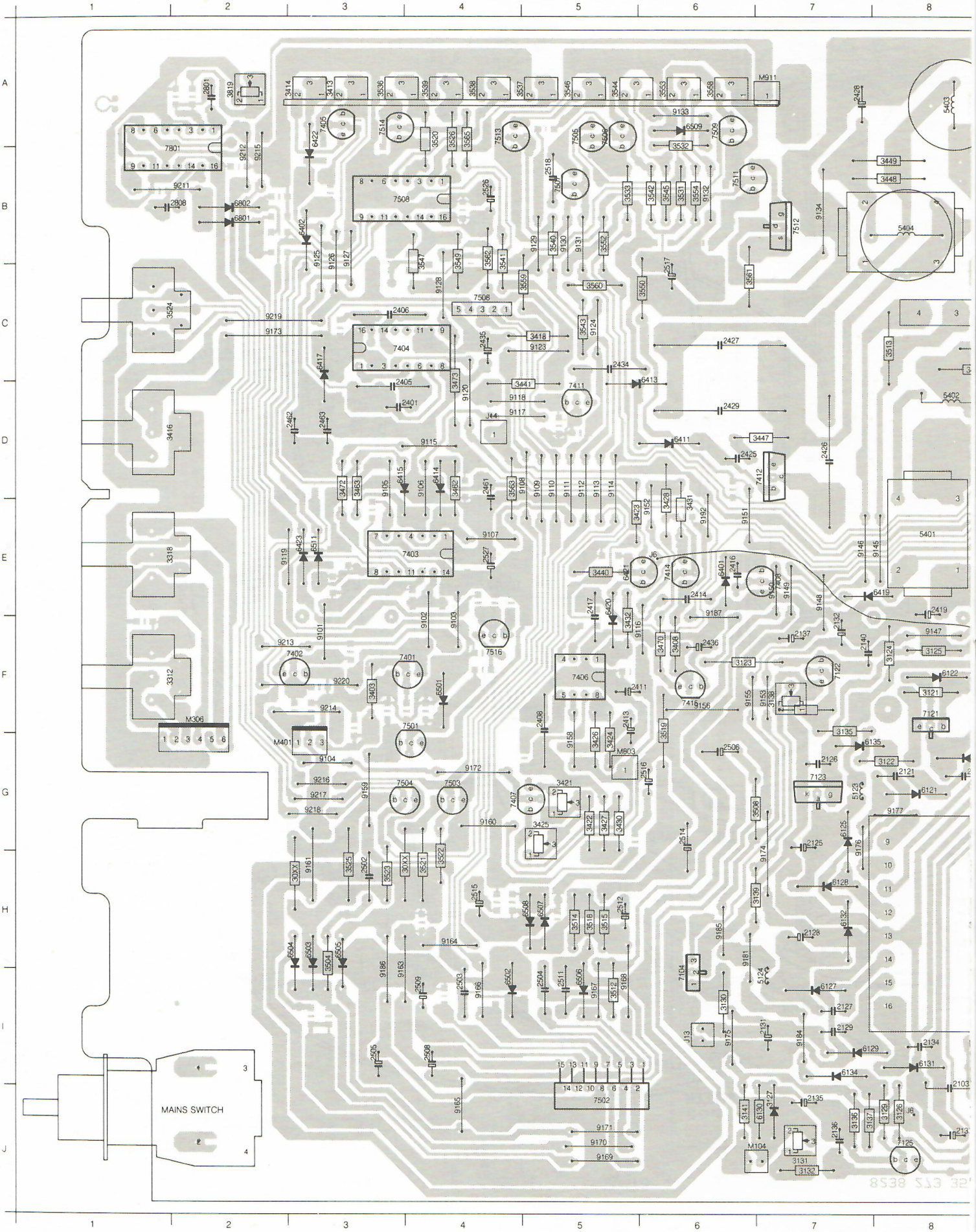
Critical components having special safety characteristics are identified with a ⚠ by the Ref. No. in the parts list and enclosed within a broken line * (where several critical components are grouped in one area) along with the safety symbol ⚠ on the schematics or exploded views.

Use of substitute replacement parts which do not have the same specified safety characteristics may create shock, fire, or other hazards.

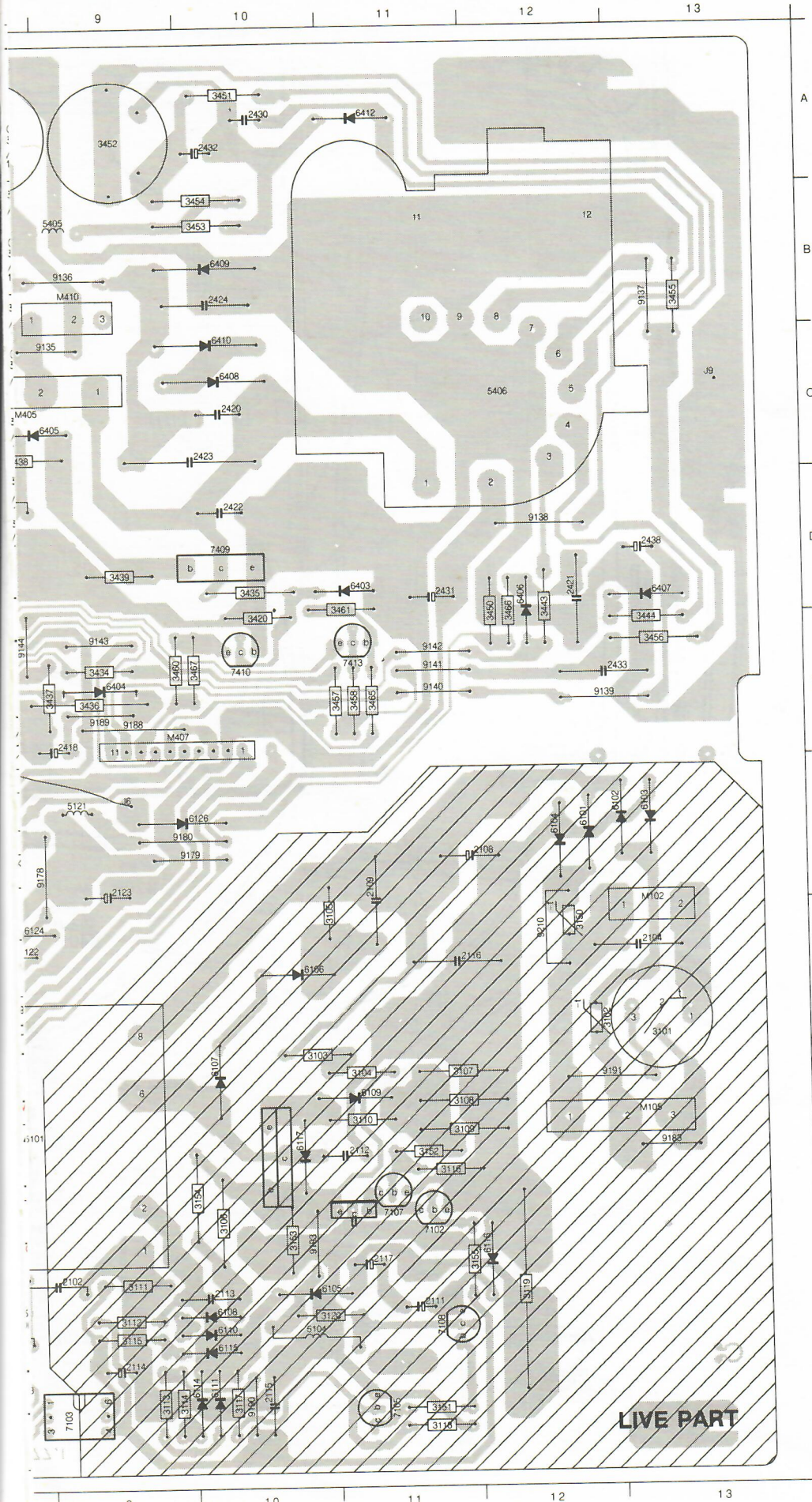
Under no circumstances should the original design be modified or altered without written permission from Philips Consumer Electronics Company. Philips assumes no liability, express or implied, arising out of any unauthorized modification of design. Servicer assumes all liability.

* Broken Line: — - — - — - — - —

MAIN PC BOARD (viewed fron



n the component side)



J6 E6
J6 F9
J8 J8
J9 C13
J13 I6
J14 D4
2102 I9
2103 I8
2104 G13
2108 F12
2109 F11
2111 I11
2112 H11
2113 I10
2114 J9
2115 J10
2116 G11
2117 I11
2121 G8
2122 G8
2123 F9
2125 G7
2126 G7
2127 I7
2128 H7
2129 I7
2131 I7
2132 F7
2133 J8
2134 I8
2135 J7
2136 J7
2137 F7
2140 F7
2401 D3
2402 E3
2404 E3
2405 D3
2406 C3
2407 D3
2408 F5
2409 F5
2410 F5
2411 F5
2412 G5
2413 F5
2414 E6
2415 F5
2416 E6
2417 E5
2418 E9
2419 E8
2420 C10
2421 D12
2422 D10
2423 C10
2424 B10
2425 D6
2426 D7
2427 C6
2428 A7
2429 D6
2430 A10
2431 D11
2432 A10
2433 E12
2434 C5
2435 C4
2436 F6
2438 D13
2440 E5
2461 D4
2462 D3
2463 D3
2501 F4
2502 H3
2503 I4
2504 I5
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2506 G6
2507 I4
2508 I4
2509 I4
2511 I5
2512 H5
2514 G6
2515 H4
2516 G6
2517 C6
2518 B5
2519 B4
2521 A5
2522 C4
2523 C4
2524 B6
2526 B4
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2528 E4
2529 A4
2801 A2
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30XX H3
30XX H4
3101 G13
3102 G12
3103 H10
3104 H11
3105 G11
3106 I10
3107 H11
3108 H11
3109 H11
3110 H11
3111 I9
3112 I9
3113 J9
3114 J9
3115 J9
3116 H11
3117 J10
3118 J11
3119 I12
3120 I10
3121 F8
3122 G8
3123 F6
3124 F8
3125 F8
3126 J8
3127 J7
3129 J8
3130 I6
3131 J7
3132 J7
3135 F7
3136 J7
3137 J7
3138 F7
3139 H7
3141 J6
3150 G12
3151 J11
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3153 I10
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3311 F1
3312 F2
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3406 F3
3407 F3
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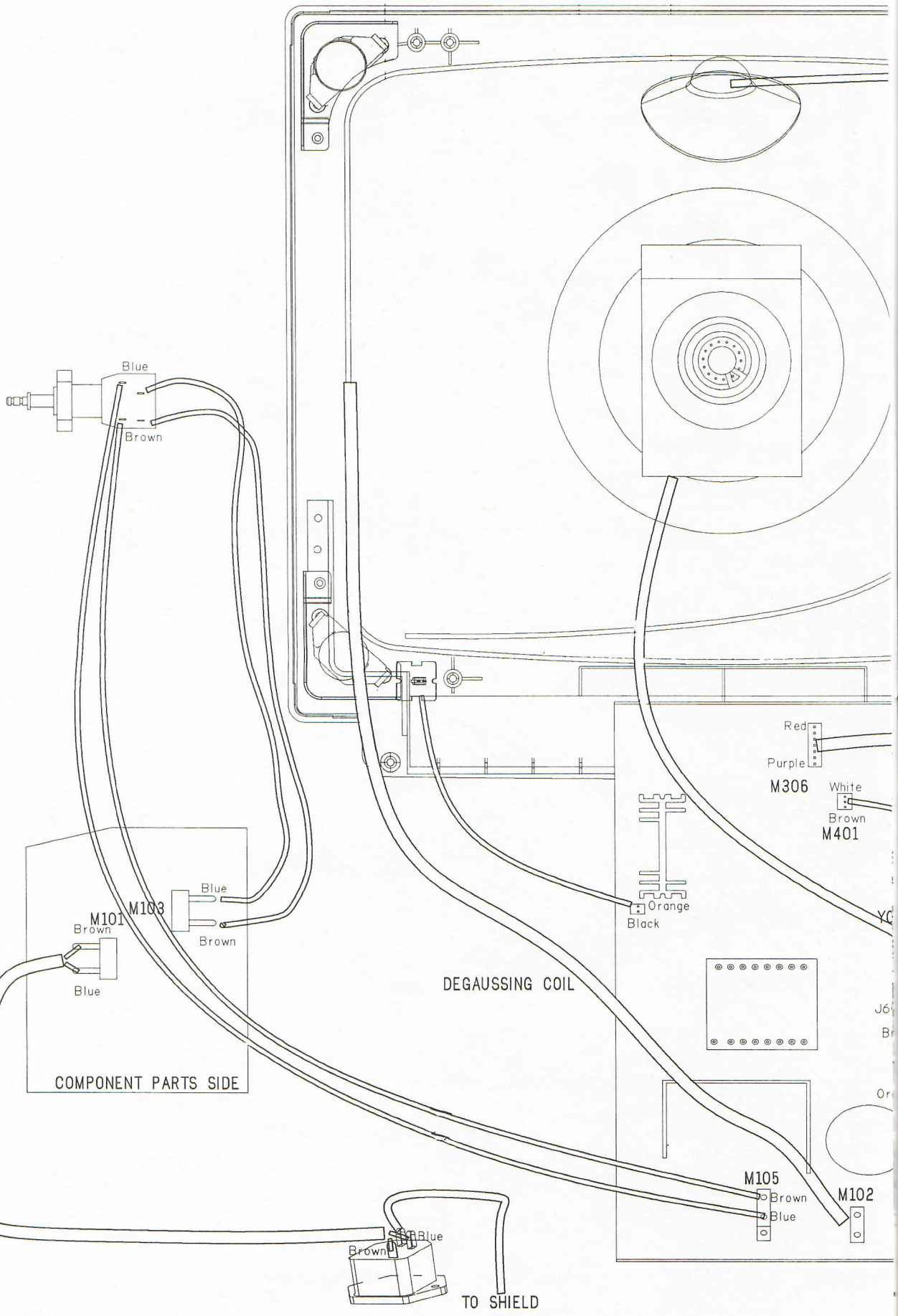
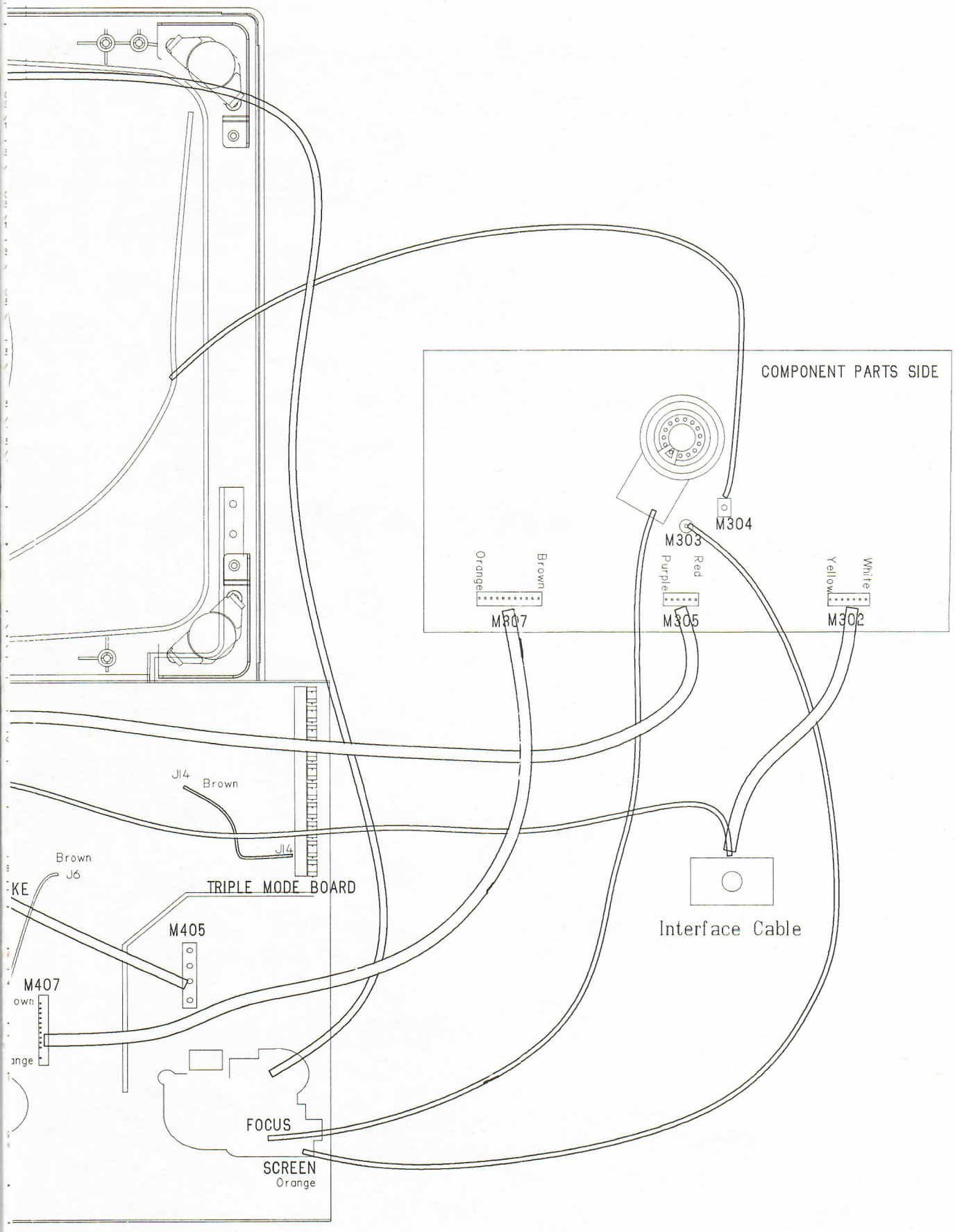
7125 J8
7401 F3
7402 F2
7403 E3
7404 C3
7405 A3
7406 F5
7407 G4
7408 E7
7409 D10
7410 E10
7411 D5
7412 D7
7413 E11
7414 E6
7415 F6
7501 F3
7502 J5
7503 G4
7504 G3
7505 A5
7506 A5
7507 B5
7508 B3
7508 C4
7509 A6
7511 B6
7512 B7
7513 A4
7514 A3
7516 F4
7801 B1
9101 F3
9102 F4
9103 F4
9104 G3
9105 D3
9106 D4
9107 E4
9108 D5
9109 D5
9110 D5
9111 D5
9112 D5
9113 D5
9114 D5
9115 D4
9116 F6
9117 D4
9118 D4
9119 E2
9120 D4
9123 C5
9124 C5
9125 C3
9126 C3
9127 C3
9128 C4
9129 B5
9130 B5
9131 B5
9132 B6
9133 A6
9134 B7
9135 C9
9136 B9
9137 B13
9138 D12
9139 E12
9140 E11
9141 E11
9142 E11
9143 E9
9144 E8
9145 E8
9146 E7
9147 F8
9148 E7
9149 E7
9150 E7
9151 E6
9152 E6
9153 F7
9155 F6
9156 F6
9158 G5
9159 G3
9160 G4
9161 H3
9163 I3
9164 H4
9165 J4
9166 I4
9167 I5
9168 I5
9169 J5
9170 J5
9171 J5
9172 G4
9173 C2
9174 H7
9175 I6
9176 H7
9177 G8
9178 F8
9179 F9
9180 F9
9181 H6
9183 H13
9184 I7
9185 H6
9186 I3
9187 E6
9188 E9
9189 E9
9190 J10
9191 H12
9192 E6
9193 I10
9210 G12
9211 B2
9212 B2
9213 F2
9214 F3
9215 B2
9216 G3
9217 G3
9218 G3
9219 C2
9220 F3
M102 G13
M104 J6
M105 H13
M306 F2
M401 G2
M405 C8
M407 E9
M410 B9
M803 G5
M911 A7

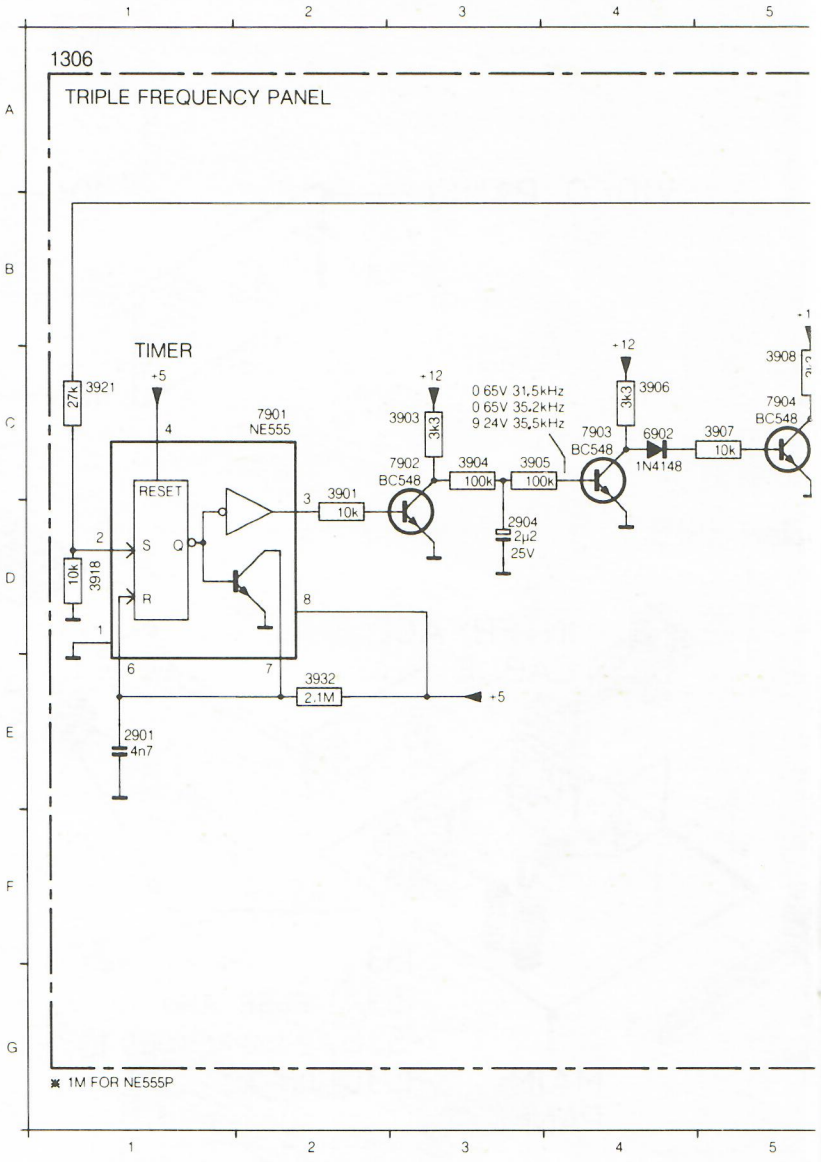

Blue
Brown
Red
Purple
M306
White
Brown
M401
Orange
Black
Blue
M103
Brown
M101
Brown
Blue
DEGAUSSING COIL
COMPONENT PARTS SIDE
M105
Brown
Blue
M102
Blue
Brown
TO SHIELD

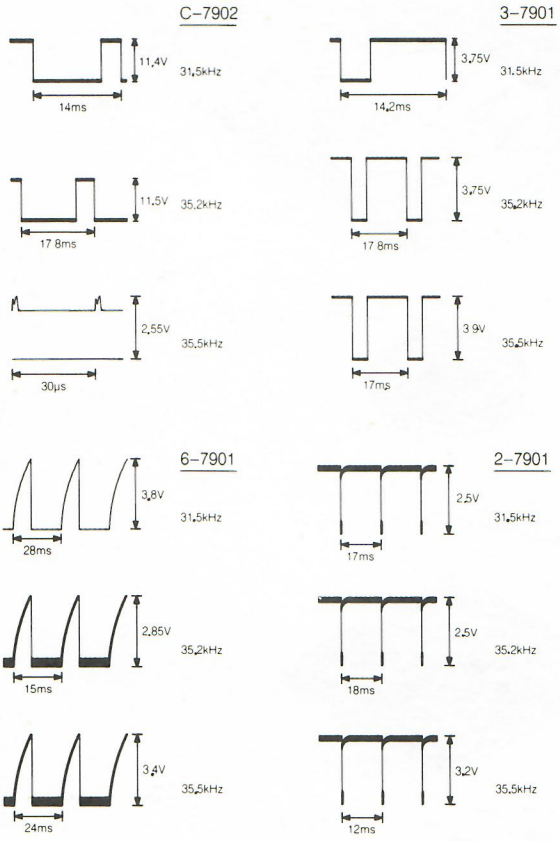
6561-20

G DIAGRAM

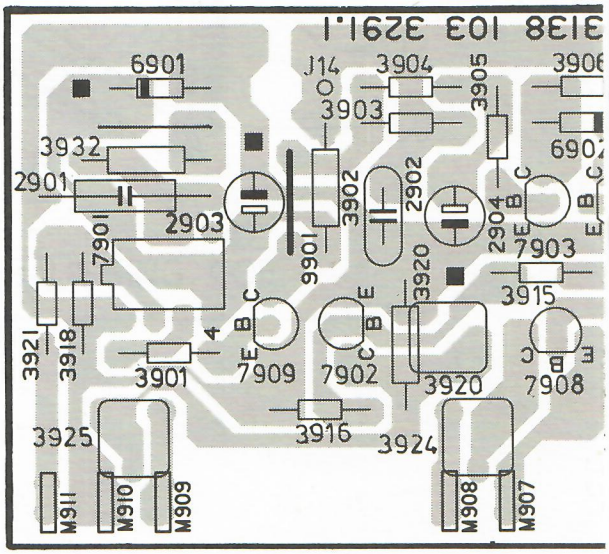


TRIPLE FREQUENCY SCHEMATIC DIAG

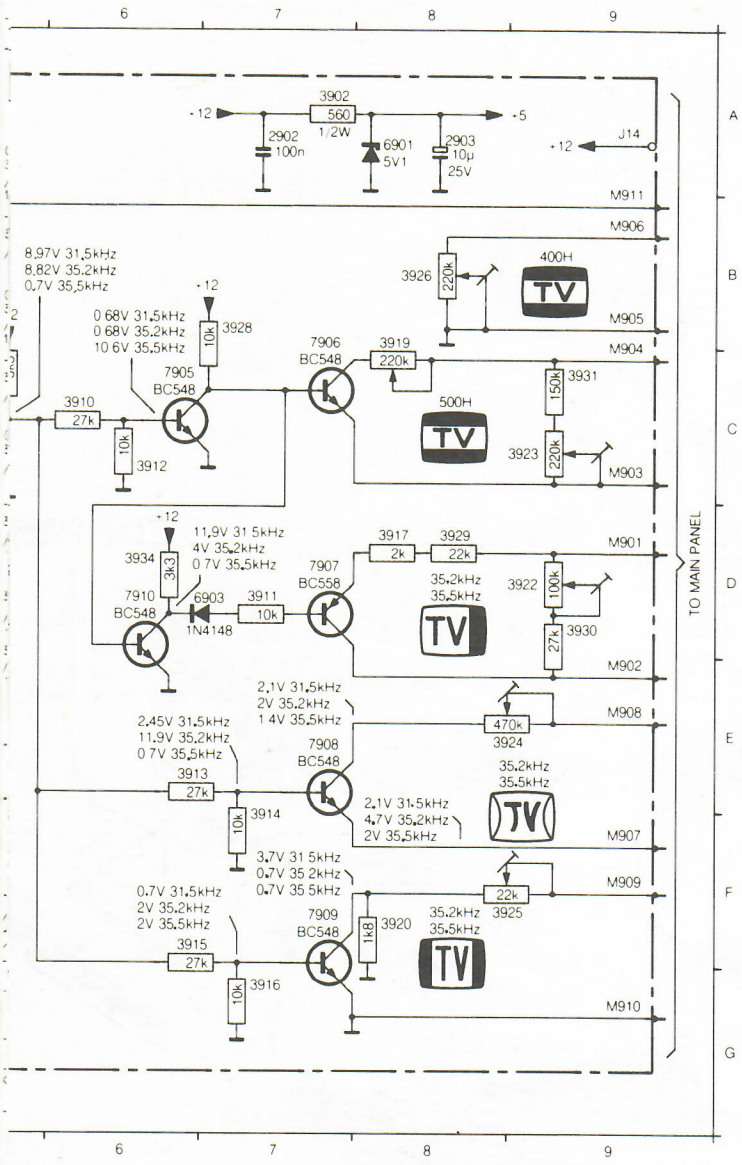




TRIPLE FREQUE
(viewed from the



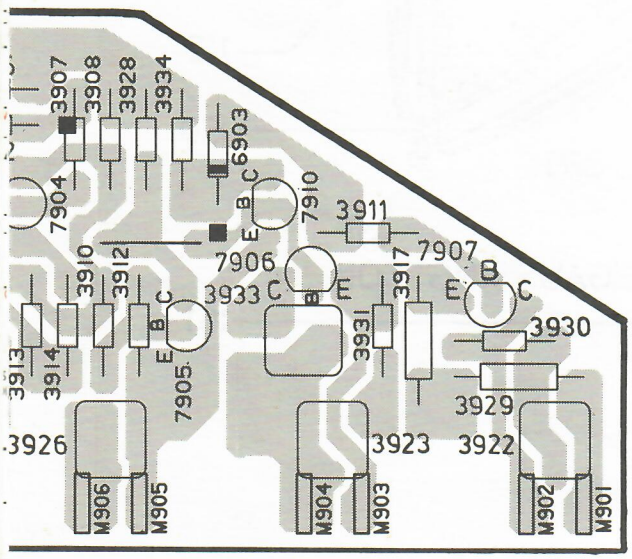
RAM (for 7CM321954I and 7CM329954I.)

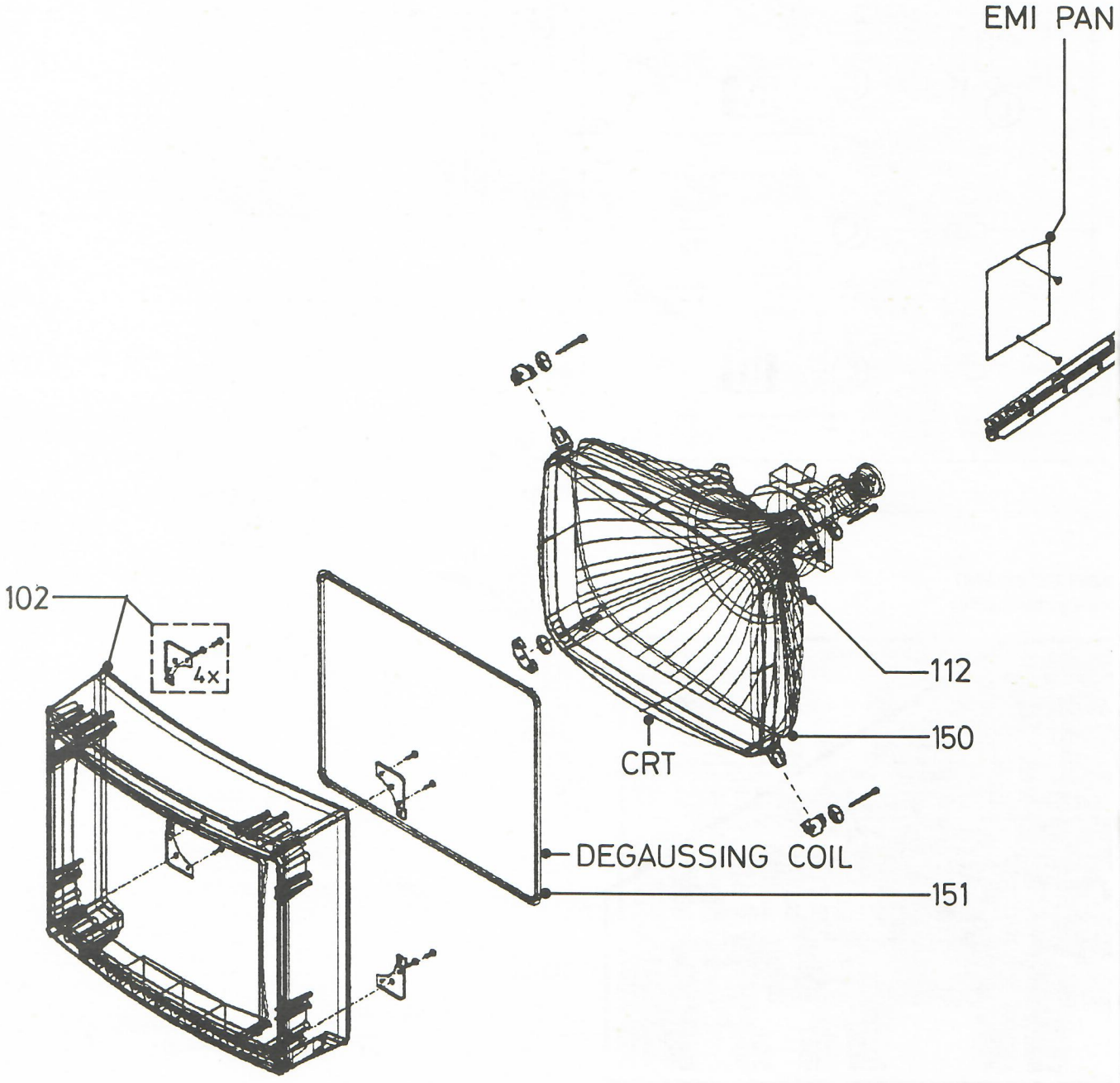


1306 A1
2901 E1
2902 A7
2903 A8
2904 D3
3901 C2
3902 A7
3903 C3
3904 C3
3905 C3
3906 C4
3907 C5
3908 C5
3909 C7
3910 C6
3911 D7
3912 C6
3913 E7
3914 F7
3915 F7
3916 G7
3917 D8
3918 D1
3919 B8
3920 F8
3921 C1
3922 D9
3923 C9
3924 E9
3925 F9
3926 B8
3928 B27
3929 D8
3930 D9
3931 C9
3932 E2
3934 D6
6901 A8
6902 C4
6903 D7
7901 C2
7902 C3
7903 C4
7904 C5
7905 C6
7906 B7
7907 D7
7908 E7
7909 F7
7910 D6

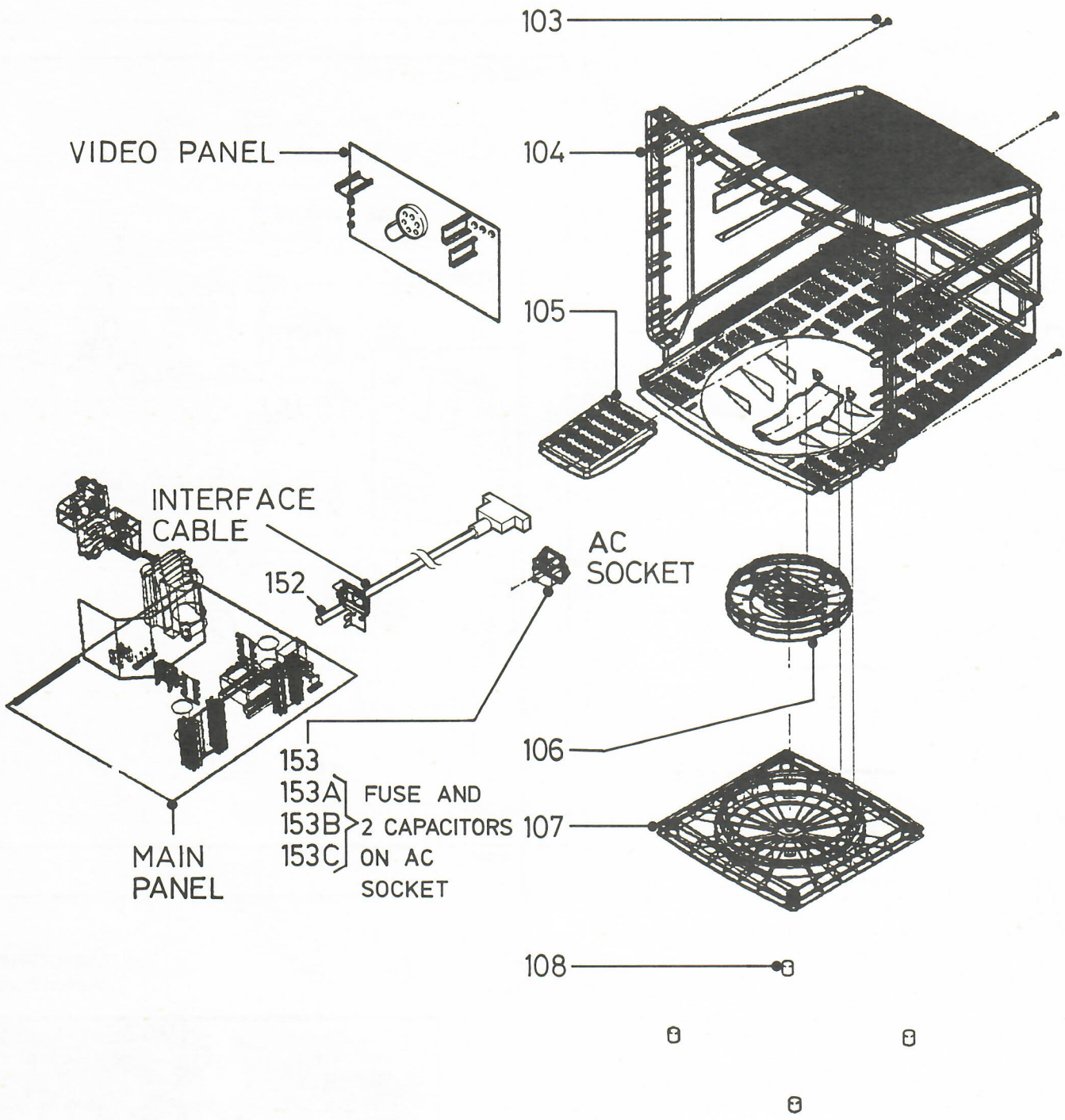
In the schematics, the values of resistors are indicated without decimal points.
Example: 3k9 stands for 3.9k.
Example: 4R7 stands for 4.7 ohm.

ENCY PC BOARD
component side)




EMI PAN
102
4x
112
150
CRT
DEGAUSSING COIL
151

LODED VIEW


103
VIDEO PANEL
104
105
INTERFACE CABLE
152
AC SOCKET
153
153A
153B
153C
FUSE AND 2 CAPACITORS ON AC SOCKET
MAIN PANEL
106
107
108

6CM321954I / 7CM321954I / 7CM329954I REPLACEMENT PARTS LIST

REF.	DESCRIPTION	PART NUMBER
	CABINET and MISCELLANEOUS	
	CONN. M305	4822 265 20366
	KNOB POTM.	4822 413 31659
	SOCKET 4-P	4822 267 31357
	CRT holder	4822 255 70245
	Connector 7 P.	4822 265 41108
	CONN. 2-P	4822 265 20367
	Connector 6 P.	4822 265 30897
	INTERF. CABLE (7CM321/7CM329)	4822 321 61243
	INTERF. CABLE (6CM321)	4822 321 61371
	SOCKET 3 P.	4822 265 30896
	INSULATION PLATE	4822 466 92891
	SPRING POWER TRANS.	4822 492 62076
	SOCKET 2-POLE	4822 265 20235
	SOCKET 2-POLE	4822 267 30987
	PUSH BUTTON	4822 410 61332
	POWER SWITCH (SK1)	4822 276 11504
	EMI PANEL ASSY	4822 212 23759
	SILICON GREASE	5322 390 20011
	DFU (7CM329)	4822 736 52536
	DFU (6CM321)	4822 736 52608
	DFU (7CM321)	4822 736 52483
	POWER CABLE	4822 321 22552
102	FRONT (7CM321)	4822 430 10345
102	FRONT (7CM329)	4822 430 10351
102	FRONT (6CM321)	4822 430 10356
103	SCREW	4822 502 30619
104	REAR COVER (6CM321/7CM321)	4822 438 10363
104	REAR COVER (7CM329)	4822 438 10364
105	PEDESTAL COVER	4822 432 92585
106	DISC	4822 432 10828
107	FOOT	4822 462 10419
108	PAD	4822 462 40831
110	SPRING POWER BUTTON	4822 492 70913
111	POWER BUTTON	4822 410 61332
112	SPOILER	4822 526 20183
150	CRT M34KBV80X-17 (6CM321/7CM321)	4822 131 20425
150	CRT M34KBV280X-18 (7CM329)	4822 131 20428
151	DEGAUSS. COIL (6CM321/7CM321)	4822 157 63308
151	DEGAUSS. COIL (7CM329)	4822 157 63389
⚠ 153A	FUSE SD6 (3.0A)	4822 253 30175
	CAPACITORS	
⚠ 2102	4.7nF 20% 400V	4822 126 10177
⚠ 2103	4.7nF 20% 400V	4822 126 10177
2104	47nF 400V	4822 121 43516
⚠ 2108	330fF 10% 200V	4822 124 22682
2109	47nF 400V	4822 121 43516
2111	470uF 20% 35V	4822 124 41996
2112	220pF 10% 400V	4822 122 32569
2113	100nF 10% 250V	4822 121 41689
2114	1uF 20% 50V	4822 124 22669
2115	15nF 20% 400V	4822 121 43917
2116	100nF 10% 400V	4822 121 43918
2117	470uF 20% 35V	4822 124 41996
2121	330pF 2KV	4822 122 33691
2122	100pF 5% 2KV	4822 126 10783
2123	100uF 20% 200V	4822 124 41991
2125	100uF 20% 100V	4822 124 41469
⚠ 2126	22uF 25V	4822 124 23301
2127	220pF 500V	4822 122 33645
2128	470uF 20% 35V	4822 124 41996
2129	220pF 500V	4822 122 33645
2131	1500uF 20% 25V	4822 124 42143
2132	100uF 20% 25V	4822 124 40207
2133	1000uF 20% 16V	5322 124 10623
2134	220pF 500V	4822 122 33645
2135	47uF 20% 16V	4822 124 22681
2136	10nF 10% 50V	4822 122 33966
2137	47uF 50% 50V	4822 124 22664
2140	10nF 10% 50V	4822 122 33966
2183	47nF 20% 250V	4822 121 43385
2183	CERC 47n	4822 121 43385
2186	220pF 250V	4822 126 10788
2186	CERC 220P	4822 126 10788
2188	CERC 220P	4822 126 10788
2188	220pF 250V	4822 126 10788
2301	10uF 16V	4822 124 22686
2302	10uF 16V	4822 124 22686
2303	10uF 16V	4822 124 22686
2304	10uF 16V	4822 124 22686
2305	1uF 20% 63V	4822 124 40242
2306	2.2nF 10% 500V	4822 122 31934
2307	680pF 5% 500V	4822 122 33967
2308	100nF 10% X7R 63V	4822 122 33496
2309	100nF 10% X7R 63V	4822 122 33496
2310	2KV 470pF	4822 122 40427
2311	100nF 10% X7R 63V	4822 122 33496
2312	100nF 10% X7R 63V	4822 122 33496
2313	100nF 10% X7R 63V	4822 122 33496
2314	100nF 10% X7R 63V	4822 122 33496
2315	22uF 20% 63V	4822 124 40804
2317	100uF 20% 16V	4822 124 22678
2319	47uF 16V	4822 124 22056
2322	10nF 10% 50V	4822 122 33966
2324	1uF 20% 160V	4822 124 22675
2326	1uF 20% 160V	4822 124 22675
2327	4.7uF 50% 160V	4822 124 40387
2328	10uF 16V	4822 124 22686
2331	10nF 10% 50V	4822 122 33966
2333	100pF 5% 50V	4822 122 31765
2334	100pF 5% 50V	4822 122 31765
2335	100pF 5% 50V	4822 122 31765
2336	10nF 10% 50V	4822 122 33966
2337	22uF 100 V	4822 124 40764
2338	22uF 20% 100V	4822 124 42147
2339	22uF 20% 100V	4822 124 42147
2340	22uF 20% 100V	4822 124 42147
2342	470nF 10% 100V	4822 121 43913
2343	470nF 10% 100V	4822 121 43913
2344	470nF 10% 100V	4822 121 43913
2346	22uF 100 V	4822 124 40764
2351	10pF 10% 50V	4822 122 31971
2352	10pF 10% 50V	4822 122 31971
2353	10pF 10% 50V	4822 122 31971
2401	2.7 nF 50V	4822 121 43769
2402	100nF 10% X7R 63V	4822 122 33496
2404	100nF 10% X7R 63V	4822 122 33496
2405	1.5nF 63V	4822 121 43824
2406	3.3nF 5% 63V	4822 121 43919

6CM321954I / 7CM321954I / 7CM329954I REPLACEMENT PARTS LIST (CONTINUED)

REF.	DESCRIPTION	PART NUMBER
	CAPACITORS (CONT.)	
2407	10nF 50V	4822 122 32442
2408	2.7nF 1% 160V	5322 121 54065
2409	10nF 50V	4822 122 32442
2410	10nF 50V	4822 122 32442
2411	100uF 20% 16V	5322 124 10617
2412	4.7nF 10% X7R 50V	4822 122 31784
2413	1uF 20% 50V	4822 124 22669
2414	220nF 10% 100V	4822 121 43686
2415	100nF 10% X7R 63V	4822 122 33496
2416	27pF 5% 500V	4822 122 33969
2417	10nF 400V	4822 121 43515
2418	2.2uF 20% 63V	4822 124 22672
2419	47uF 50% 50V	4822 124 22664
2420	2KV 470pF	4822 122 40427
2421	330nF 10% 250V	4822 121 43916
2422	100pF 5% 2KV	4822 126 10783
2423	5.6nF 5% 1.6KV	4822 121 43677
2424	15nF 5% 400V	4822 121 43678
2427	470nF 5% 250V (7CM321/7CM329)	4822 121 43679
2427	0.47uF 250V (6CM321)	4822 121 43681
2428	6.8uF 50V	4822 124 22461
2429	470nF 5% 250V (7CM321/7CM329)	4822 121 43679
2429	0.47uF 250V (6CM321)	4822 121 43681
2430	220pF 500V	4822 122 33645
2431	47F 160V	4822 124 22365
2432	220uF 16V	5322 124 41817
2433	47nF 10% 250V	4822 121 40336
2435	100uF 20% 16V	4822 124 22678
2436	47uF 20% 16V	4822 124 22681
2438	4.7uF 50% 160V	4822 124 40387
2440	100nF 10% X7R 63V	4822 122 33496
2461	470nF 100V	4822 121 43698
2462	470nF 100V	4822 121 43698
2463	470nF 100V	4822 121 43698
2501	10nF 50V	4822 122 32442
2502	100nF 10% 100V	4822 121 43685
2503	100nF 100V	4822 121 43696
2504	330nF 100V	4822 121 43713
2505	220uF 20% 35V	4822 124 42173
2506	1000F 35V	4822 124 22362
2507	47nF 10% X7R 63V	4822 122 32542
2508	220uF 20% 35V	4822 124 42173
2509	1uF 20% 50V	4822 124 22669
2511	220nF 10% 100V	4822 121 43686
2512	100uF 20% 16V	4822 124 22678
2514	4700MU 10% 25V	4822 124 21502
2515	10uF 16V	4822 124 22686
2516	1uF 20% 50V	4822 124 22669
2517	100uF 20% 40V	4822 124 22336
2518	220nF 10% 100V	4822 121 43686
2519	10nF 50V	4822 122 32442
2521	100nF 10% X7R 63V	4822 122 33496
2522	100nF 10% X7R 63V	4822 122 33496
2523	100nF 10% X7R 63V	4822 122 33496
2524	2.2nF 10% 63V	4822 122 31644
2526	100uF 20% 16V	4822 124 22678
2527	100uF 20% 16V	4822 124 22678
2528	10nF 50V	4822 122 32442
2529	100nF 10% X7R 63V	4822 122 33496
2801	3.9nF 1% 160V	5322 121 54127
2805	10nF 50V	4822 122 32442
2808	3.9nF 1% 160V	5322 121 54127
2901	4.7 nF 1% 63V (7CM321/7CM329)	4822 121 50539
2902	100nF 10% 63V (7CM321/7CM329)	4822 122 33496
2903	10uF 16V (7CM321/7CM329)	4822 124 22686
2904	2.2uF 20% 25V (7CM321/7CM329)	4822 124 42031
	RESISTORS	
⚠3101	PTC	4822 116 40126
3102	6 ohm 15%	4822 116 30341
3103	390K 1% 0.6W	4822 050 23904
3104	390K 1% 0.6W	4822 050 23904
⚠3105	22K 5W 1W	4822 116 80388
⚠3106	68 ohm 5% 1W	4822 116 81822
⚠3107	0.43 ohm 5% 1W	4822 116 82453
⚠3108	0.43 ohm 5%	4822 116 82453
⚠3109	0.43 ohm 5%	4822 116 82453
⚠3110	2 ohm 5%	4822 116 82451
3111	470 ohm 1% 0.6W	4822 050 24701
3112	2.7K 1% 0.6W	4822 050 22702
3113	1K 1% 0.6W	4822 050 21002
3114	2K 1% 0.6W	4822 050 22002
3115	47 ohm 1% 0.6W	4822 050 24709
3117	1K 1% 0.6W	4822 050 21002
3118	1K 1% 0.6W	4822 050 21002
⚠3119	5.6 ohm 10% 10W	4822 113 80517
3120	24 ohm 5% 0.5W	4822 116 52187
3121	3.30K 1% 0.6W	4822 050 23302
3122	22K 1% 0.6W	4822 050 22203
3123	22K 1% 0.6W	4822 050 22203
3124	100K 1% 0.6W	4822 050 21004
3125	1K 1% 0.6W	4822 050 21002
3126	390 ohm 1% 0.6W	4822 050 23901
3127	4.30K 1% 0.6W	4822 050 24302
3129	13K 1% 0.6W	4822 050 21303
⚠3130	1.50 ohm 5% 0.33W	4822 052 10158
3131	470 ohm potm.	4822 101 10927
3132	2.20K 1% 0.6W	4822 050 22202
3135	22K 1% 0.6W	4822 050 22203
3136	2.7K 1% 0.6W	4822 050 22702
⚠3137	15K 1% 0.6W	4822 050 21503
3138	22K 30% LIN (7CM321/7CM329)	4822 100 11213
3138	10K TRIM. LIN (6CM321)	4822 100 20166
3139	43K 1% 0.6W (7CM321/7CM329)	4822 050 24303
3139	24K (6CM321)	4822 050 22403
3141	1.50K 1% 0.6W	4822 050 21502
3151	33 ohm 5% 0.5W	4822 116 52191
3152	27 ohm 5% 0.5W	4822 116 52188
3153	20K 1% 0.6W	4822 050 22003
3154	82 ohm 5%	4822 116 82872
3155	27 ohm 5% 0.5W	4822 116 52188
3186	HT RES 330K	4822 053 21334
3301	75 ohm 2% 0.25W	4822 051 10759
3302	75 ohm 2% 0.25W	4822 051 10759
3303	75 ohm 2% 0.25W	4822 051 10759
3304	1.5K 5% 0.5W	4822 116 80547
3305	15K 5% 0.5W	4822 116 80548
3307	10K 2% 0.25W	4822 051 10103
3308	10K 2% 0.25W	4822 051 10103

6CM321954I / 7CM321954I / 7CM329954I REPLACEMENT PARTS LIST (CONTINUED)

REF.	DESCRIPTION	PART NUMBER
	RESISTORS (CONT.)	
3309	10K 2% 0.25W	4822 051 10103
3310	5.60K 2% 0.25W	4822 051 10562
3311	680 ohm 2% 0.25W	4822 051 10681
3311	680 ohm 2% 0.25W	4822 051 10681
3312	10K 20%	4822 102 10431
3312	10K 20% potm.	4822 102 10431
3313	2.20K 5% 0.1W	4822 051 20222
3314	2.20K 5% 0.1W	4822 051 20222
3315	4.7K 2% 0.25W	4822 051 10472
3316	10K TRIM	4822 100 11141
3318	100K 20%	4822 102 10429
3318	100K 20% potm.	4822 102 10429
3319	10 ohm 2% 0.25W	4822 051 10109
3320	4.7K 2% 0.25W	4822 051 10472
3321	100 ohm 30% LIN	4822 100 11597
3322	10K 2% 0.25W	4822 051 10103
3323	10 ohm 2% 0.25W	4822 051 10109
3324	100 ohm 30% LIN	4822 100 11597
3325	10K 2% 0.25W	4822 051 10103
3326	47 ohm 2% 0.25W	4822 051 10479
3327	100 ohm 30% LIN	4822 100 11597
3328	10K 2% 0.25W	4822 051 10103
3329	4.70 ohm 5% 0.33W	4822 052 10478
3330	10K 2% 0.25W	4822 051 10103
3331	10K 2% 0.25W	4822 051 10103
3332	1.20K 2% 0.25W	4822 051 10122
3333	47K 1% 0.6W	4822 050 24703
3334	4.7K 2% 0.25W	4822 051 10472
3335	10K 1W	4822 116 83024
3336	15K 2% 0.25W	4822 051 10153
3337	100K 1% 0.6W	4822 050 21004
3338	330K 2% 0.25W	4822 051 10334
3339	68K 1% 0.6W	4822 050 26803
3340	10 ohm 5% 0.33W	4822 052 10109
3341	390 ohm 2% 0.25W	4822 051 10391
3342	220 ohm 1% 0.6W	4822 050 22201
3344	220 ohm 1% 0.6W	4822 050 22201
3345	390 ohm 2% 0.25W	4822 051 10391
3346	220 ohm 1% 0.6W	4822 050 22201
3347	82 ohm 1% 0.6W	4822 050 28209
3348	1.3K 5% 3W	4822 116 83025
3349	390 ohm 2% 0.25W	4822 051 10391
3350	27K 2% 0.25W	4822 051 10273
3352	82 ohm 2% 0.25W	4822 051 10829
3353	120 ohm 1% 0.125W	4822 116 90536
3354	82 ohm 2% 0.25W	4822 051 10829
3355	120 ohm 1% 0.125W	4822 116 90536
3356	82 ohm 2% 0.25W	4822 051 10829
3357	390 ohm 2% 0.25W	4822 051 10391
3358	1K 2% 0.25W	4822 051 10102
3359	560 ohm 1% 0.6W	4822 050 25601
3361	680 ohm 1% 0.6W	4822 050 26801
3362	47 ohm 2% 0.25W	4822 051 10479
3364	47 ohm 2% 0.25W	4822 051 10479
3365	1.3K 5% 3W	4822 116 83025
3366	10 ohm 5% 0.33W	4822 052 10109
3367	47 ohm 2% 0.25W	4822 051 10479
3370	10 ohm 5% 0.33W	4822 052 10109
3371	1.3K 5% 3W	4822 116 83025
3372	4.7K 2% 0.25W	4822 051 10472
3373	100K TRIM. LIN	5322 100 11539
3374	220K 2% 0.25W	4822 051 10224
3375	4.7K 2% 0.25W	4822 051 10472
3376	100K TRIM. LIN	5322 100 11539
3377	220K 2% 0.25W	4822 051 10224
3378	4.7K 2% 0.25W	4822 051 10472
3379	100K TRIM. LIN	5322 100 11539
3381	220K 2% 0.25W	4822 051 10224
3382	100K 2% 0.25W	4822 051 10104
3383	100K 2% 0.25W	4822 051 10104
3384	100K 2% 0.25W	4822 051 10104
3385	330K 2% 0.25W	4822 051 10334
3386	330K 2% 0.25W	4822 051 10334
3387	330K 2% 0.25W	4822 051 10334
3388	2.20K 5% 0.1W	4822 051 20222
3391	220 ohm 5% 0.5W	4822 116 80549
3392	220 ohm 5% 0.5W	4822 116 80549
3393	220 ohm 5% 0.5W	4822 116 80549
3401	2.7K 2% 0.25W	4822 051 10272
3402	4.7K 2% 0.25W	4822 051 10472
3403	2.7K 1% 0.6W	4822 050 22702
3404	3.30K 2% 0.25W	4822 051 10332
3405	100K 2% 0.25W	4822 051 10104
3406	3.30K 2% 0.25W	4822 051 10332
3407	4.7K 2% 0.25W	4822 051 10472
3408	560K 1% 0.6W	4822 050 25604
3409	100K 2% 0.25W	4822 051 10104
3410	2.7K 2% 0.25W	4822 051 10272
3412	15K 2% 0.25W	4822 051 10153
3413	10K TRIM	4822 100 11141
3415	10K 2% 0.25W	4822 051 10103
3416	2K 20% potm.	4822 102 10427
3417	12K 2% 0.25W	4822 051 10123
3418	470 ohm 1% 0.6W	4822 050 24701
3419	10K 2% 0.25W	4822 051 10103
3420	68K 1% 0.6W	4822 050 26803
3421	100K LIN 0.1W (7CM321/7CM329)	4822 100 11163
3421	47K TRIM. LIN (6CM321)	4822 100 11392
3422	75K 1% 0.6W (7CM321/7CM329)	4822 050 27503
3422	47K (6CM321)	4822 050 24703
3423	1.50K 1% 0.6W	4822 050 21502
3424	1.80K 1% 0.6W	4822 050 21802
3425	4.7K LIN 0.1W	4822 100 11319
3426	2.20K 1% 0.4W	4822 050 12202
3427	1.80K 1% 0.6W	4822 050 21802
⚠ 3428	180 ohm 5% 2W	4822 116 80551
3429	150K 2% 0.25W	4822 051 10154
3430	13K 1% 0.6W	4822 050 21303
3431	680 ohm 1% 0.6W	4822 050 26801
3432	220 ohm 1% 0.6W	4822 050 22201
3433	12K 2% 0.25W	4822 051 10123
3434	22K 1% 0.6W	4822 050 22203
3435	1.50M 1% 0.6W	4822 050 21505
⚠ 3436	820 ohm 5% 1W	4822 116 82454
⚠ 3437	4.7 ohm 5% 0.33W	4822 052 10478
3438	3.3 ohm 5% 5W	4822 113 80515
3439	68 ohm 1% 0.6W	4822 050 26809
3440	7.5K 0.25W	4822 116 82455
3442	100K 2% 0.25W	4822 051 10104
⚠ 3443	100 ohm 5% 0.33W	4822 052 10101
⚠ 3444	1.50 ohm 5% 0.33W	4822 052 10158
⚠ 3448	470 ohm 5% 1W	4822 116 82053

6CM321954I / 7CM321954I / 7CM329954I REPLACEMENT PARTS LIST (CONTINUED)

REF.	DESCRIPTION	PART NUMBER
	RESISTORS (CONT.)	
⚠3449	470 ohm 5% 1W	4822 116 82053
⚠3450	18K 1% 0.6W	4822 050 21803
⚠3451	1.50 ohm 5% 0.33W	4822 052 10158
⚠3452	TRIM POTM. 100 ohm	4822 100 20647
⚠3453	82 ohm 1W	4822 116 80542
⚠3454	82 ohm 1W	4822 116 80542
3455	100K 1% 0.6W	4822 050 21004
3456	1K 5% 0.5W	4822 116 80545
3457	33K 1% 0.6W	4822 050 23303
3458	100K 1% 0.6W	4822 050 21004
3459	1K 2% 0.25W	4822 051 10102
3460	220 ohm 5% 0.5W	4822 116 52215
3461	1K 1% 0.6W	4822 050 21002
3462	22K 1% 0.6W	4822 050 22203
3463	100K 1% 0.6W	4822 050 21004
3464	10K 2% 0.25W	4822 051 10103
3465	10K 1% 0.6W	4822 050 21003
3466	120K 5% 0.5W	4822 116 80556
3467	220 ohm 5% 0.5W	4822 116 52215
3469	22K 2% 0.25W	4822 051 10223
3470	82K 1% 0.6W	4822 050 28203
3471	1.80K 2% 0.25W	4822 051 10182
3472	2.7K 1% 0.6W	4822 050 22702
3473	470 ohm 1% 0.6W	4822 050 24701
3474	2.7K 2% 0.25W	4822 051 10272
3501	2.20K 5% 0.1W	4822 051 20222
3502	1K 2% 0.25W	4822 051 10102
3503	1K 2% 0.25W	4822 051 10102
3504	10 ohm 1% 0.6W	4822 050 21009
3505	8.20K 2% 0.25W	4822 051 10822
3506	3.90K 2% 0.25W	4822 051 10392
3507	4.7K 2% 0.25W	4822 051 10472
⚠3508	2.20 ohm 5% 0.33W	4822 052 10228
⚠3509	4.7K 2% 0.25W	4822 051 10472
3510	2.20K 5% 0.1W	4822 051 20222
3511	820K 2% 0.25W	4822 051 10824
3512	2.20 ohm 1% 0.6W	4822 050 22208
3513	220 ohm 5% 0.5W	4822 116 52215
3514	1.2K 1% 0.25W	4822 116 82988
3515	2.20K 1% 0.6W	4822 050 22202
3516	100 ohm 2% 0.25W	4822 051 10101
3517	47 ohm 2% 0.25W	4822 051 10479
3518	100 ohm 1% 0.6W	4822 050 21001
⚠3519	2 ohm 1W	4822 116 82642
3520	120K (6CM321)	4822 050 21204
⚠3521	220 ohm 5%	4822 116 82452
3522	1.80K 1% 0.6W	4822 050 21802
3523	5.60K 1% 0.6W	4822 050 25602
3524	10K POTM	4822 102 10428
⚠3525	150 ohm 5% 1W	4822 116 80553
3526	100K 1% 0.6W	4822 050 21004
3527	470 ohm 2% 0.25W	4822 051 10471
3528	1K 2% 0.25W	4822 051 10102
3531	10K 1% 0.6W	4822 050 21003
3532	2.20K 1% 0.6W	4822 050 22202
3533	47K 1% 0.6W	4822 050 24703
3534	39K 2% 0.25W	4822 051 10393
3535	6.80K 2% 0.25W	4822 051 10682
3536	220K TRIM. LIN (6CM321)	5322 100 11544
3537	220K TRIM. LIN	5322 100 11544
3538	220K TRIM. LIN (6CM321)	5322 100 11544
3539	220K TRIM. LIN	5322 100 11544
3540	10K 1% 0.6W	4822 050 21003
3541	150K 1% 0.6W	4822 050 21504
3542	15K 1% 0.6W	4822 050 21503
3544	10K TRIM	4822 100 11141
3545	100K 1% 0.6W	4822 050 21004
3546	470K TRIM. LIN (6CM321)	4822 100 11598
3547	10M 5% 0.25W	4822 110 72214
3548	220K 2% 0.25W	4822 051 10224
3549	4.70M 1% 0.6W	4822 050 24705
⚠3550	4.7 ohm 5% 0.33W	4822 052 10478
3551	1.20M 5% 0.25W	4822 051 10125
3552	4.70M 1% 0.6W	4822 050 24705
3553	10K TRIM	4822 100 11141
3554	270K 1% 0.6W	4822 050 22704
3555	4.7K 2% 0.25W	4822 051 10472
3556	680 ohm 2% 0.25W	4822 051 10681
3557	2.7K 2% 0.25W	4822 051 10272
3558	22K TRIM. LIN (6CM321)	4822 100 11585
3559	10K 1% 0.6W	4822 050 21003
⚠3561	2.7 ohm 5% 0.33W	4822 052 10278
⚠3562	4.7 ohm 5% 0.33W	4822 052 10478
⚠3563	4.7 ohm 5% 0.33W	4822 052 10478
3565	330K 1% 0.6W	4822 050 23304
3566	120K 2% 0.25W	4822 051 10124
3801	10K 2% 0.25W	4822 051 10103
3802	10K 2% 0.25W	4822 051 10103
3803	2.2M 1% 0.4W	4822 050 22205
3804	2.2M 1% 0.4W	4822 050 22205
3811	8.20K 2% 0.25W	4822 051 10822
3812	12K 2% 0.25W	4822 051 10123
3815	20K 2% 0.25W	4822 051 10203
3819	100K LIN 0.1W	4822 100 11163
3901	10K 2% .25W (7CM321/7CM329)	4822 051 10103
3902	560 ohm 1% 0.6W (7CM321/7CM329)	4822 050 25601
3903	3.3K 2% 0.25W (7CM321/7CM329)	4822 051 10332
3904	100K 2% 0.25W (7CM321/7CM329)	4822 051 10104
3905	100k 2% 0.25W (7CM321/7CM329)	4822 051 10104
3906	3.3K 2% 0.25W (7CM321/7CM329)	4822 051 10332
3907	10K 2% 0.25W (7CM321/7CM329)	4822 051 10103
3908	3.3K 2% 0.25W (7CM321/7CM329)	4822 051 10332
3910	27K 2% 0.25W (7CM321/7CM329)	4822 051 10273
3911	10K 2% 0.25W (7CM321/7CM329)	4822 051 10103
3912	10K 2% 0.25W (7CM321/7CM329)	4822 051 10103
3913	27K 2% 0.25W (7CM321/7CM329)	4822 051 10273
3914	10K 2% 0.25W (7CM321/7CM329)	4822 051 10103
3915	27K 2% 0.25W (7CM321/7CM329)	4822 051 10273
3916	10K 2% 0.25W (7CM321/7CM329)	4822 051 10103
3917	2K 1% 0.4W (7CM321/7CM329)	4822 050 12002
3918	10K 2% 0.25W (7CM321/7CM329)	4822 051 10103
3919	220K 0.1W POTM. (7CM321/7CM329)	4822 101 11003
3920	1.8K 1% 0.6W (7CM321/7CM329)	4822 050 21802
3921	27K 2% 0.25W (7CM321/7CM329)	4822 051 10273
3922	100K LIN 0.1W (7CM321/7CM329)	4822 100 11163
3923	220K 0.1W POTM. (7CM321/7CM329)	4822 101 11003
3924	1K 0.1W POTM. (7CM321/7CM329)	4822 105 11023
3925	22K 30% POTM.	4822 100 11213

6CM321954I / 7CM321954I / 7CM329954I REPLACEMENT PARTS LIST (CONTINUED)

REF.	DESCRIPTION	PART NUMBER
	RESISTORS (CONT.)	
3926	220K 30% 0.1W (7CM321/7CM329)	4822 101 11003
3928	10K 2% 0.25W (7CM321/7CM329)	4822 051 10103
3929	22K 1% 0.4W (7CM321/7CM329)	4822 050 12203
3930	27K 2% 0.25W (7CM321/7CM329)	4822 051 10273
3931	150K 2% 0.25W (7CM321/7CM329)	4822 051 10154
3932	2.1M 1% 0.6W (7CM321/7CM329)	4822 050 22105
3934	3.3K 2% 0.25W (7CM321/7CM329)	4822 051 10332
	COILS AND TRANSFORMERS	
⚠ 5101	POWER TRANSFORMER	4822 146 30882
5102	LINE FILTER	4822 157 62256
5102	Line filter	4822 157 62256
5104	10uH	4822 157 52233
5121	180uH	4822 156 21399
5123	100uH	4822 157 52234
5124	100uH	4822 157 52234
5302	7.5uH	4822 152 20587
5303	3.3uH	4822 157 52493
5304	3.3uH	4822 157 52493
5305	3.3uH	4822 157 52493
⚠ 5401	TRANSFORMER	4822 148 81081
5402	5H	4822 157 53189
5403	15H	4822 157 62268
⚠ 5404	120H	4822 157 62267
5405	12mH	4822 157 53185
⚠ 5406	L.O.T.	4822 140 10388
	DIODES	
⚠ 6101	1N5061	4822 130 31933
⚠ 6102	1N5061	4822 130 31933
⚠ 6103	1N5061	4822 130 31933
⚠ 6104	1N5061	4822 130 31933
6105	SB140	5322 130 81917
6106	RGP10J	4822 130 31393
6107	RGP10J	4822 130 31393
6108	1N4148	4822 130 30621
6109	RGP15D	5322 130 31971
6110	1N4148	4822 130 30621
6111	BZX79-C6V2	4822 130 34167
6114	1N4148	4822 130 30621
6115	1N4148	4822 130 30621
6116	SB140	5322 130 81917
6117	RGP10J	4822 130 31393
⚠ 6121	RGP15J	5322 130 33885
6122	1N4004G	5322 130 34574
⚠ 6124	RGP15J	5322 130 33885
⚠ 6125	RGP15J	5322 130 33885
6126	BZX79-B18	4822 130 31024
6127	RGP10D	4822 130 31607
⚠ 6128	RGP15J	5322 130 33885
⚠ 6129	RGP15D	5322 130 31971
6130	BZX79-F6V2	4822 130 34167
6131	SB140	5322 130 81917
6132	1N4148	4822 130 30621
6134	BAV21	4822 130 30842
6135	BZX79-B24	4822 130 34398
6137	LTL3238AS	4822 130 81701
6137	LED, green	4822 130 82092
6301	1N4148	4822 130 30621
6302	1N4003	4822 130 31878
6303	1N4148	4822 130 30621
6304	1N4148	4822 130 30621
6305	1N4148	4822 130 30621
6306	1N4148	4822 130 30621
6307	1N4148	4822 130 30621
6308	1N4148	4822 130 30621
6309	1N4148	4822 130 30621
6310	BYD33G	4822 130 42489
6311	BZV85-C8V2	5322 130 33635
6315	BAV21	4822 130 30842
6316	BAV21	4822 130 30842
6317	BAV21	4822 130 30842
6318	BAV21	4822 130 30842
6319	BAV21	4822 130 30842
6321	BAV21	4822 130 30842
6322	1N4003	4822 130 31878
6323	1N4003	4822 130 31878
6401	1N4148	4822 130 30621
6402	1N4148	4822 130 30621
6403	1N4148	4822 130 30621
6404	RGP10D	4822 130 31607
6405	RGP10D	4822 130 31607
6406	BAV21	4822 130 30842
6407	RGP10G	4822 130 42489
⚠ 6408	MUR4100E	5322 130 81132
6409	UF5404	4822 130 80445
⚠ 6410	MUR4100E	5322 130 81132
6412	RGP15D	5322 130 31971
6414	1N4148	4822 130 30621
6415	1N4148	4822 130 30621
6417	BZX79-C5V1	4822 130 34233
6419	RGP10D	4822 130 31607
6420	1N4148	4822 130 30621
6421	SF0R5D43	4822 130 20245
6422	1N4148	4822 130 30621
6423	1N4148	4822 130 30621
6501	1N4148	4822 130 30621
6502	1N4148	4822 130 30621
6503	1N4148	4822 130 30621
6504	1N4148	4822 130 30621
6505	1N4003	4822 130 31878
6506	1N4148	4822 130 30621
6507	1N4148	4822 130 30621
6508	1N4148	4822 130 30621
6509	BZX79-C2V4	4822 130 31253
6511	1N4148	4822 130 30621
6801	1N4148	4822 130 30621
6802	1N4148	4822 130 30621
6901	BZX79-F5V1 (7CM321/7CM329)	4822 130 34233
6902	1N4148 (7CM321/7CM329)	4822 130 30621
6903	1N4148 (7CM321/7CM329)	4822 130 30621
	TRANSISTORS and INTEGRATED CIRCUITS	
7101	2SC3680-O	4822 130 62296
7102	BC337-40	4822 130 41344
7103	CNX62A	4822 130 80908
7104	L7812CV	4822 209 81726
7105	BC337-40	4822 130 41344

6CM321954I / 7CM321954I / 7CM329954I REPLACEMENT PARTS LIST (CONTINUED)

REF.	DESCRIPTION	PART NUMBER
	TRANSISTORS and INTEGRATED CIRCUITS (CONT.)	
7106	BD434	4822 130 40995
7107	BC337-40	4822 130 41344
7108	BC638	4822 130 41087
⚠ 7121	BDT60	4822 130 62284
7122	BF422	4822 130 41782
7123	BT151-500R	5322 130 24081
⚠ 7125	BC547	4822 130 44503
7301	LM1203	4822 209 62364
7303	BC848C	5322 130 42136
7304	BC639	4822 130 41053
7306	BC858C	4822 130 42513
7307	2SC3950E	4822 130 62278
7308	2SC3950E	4822 130 62278
7309	2SC3950E	4822 130 62278
7311	2SC3953E	4822 130 62279
7312	2SC3953E	4822 130 62279
7313	2SC3953E	4822 130 62279
7314	BF422	4822 130 41782
7315	BF423	4822 130 41646
7316	BF422	4822 130 41782
7317	BF423	4822 130 41646
7318	BF422	4822 130 41782
7319	BF423	4822 130 41646
7321	BF423	4822 130 41646
7322	BF423	4822 130 41646
7323	BF423	4822 130 41646
7401	PH2369	4822 130 41594
7402	PH2369	4822 130 41594
7403	HEF4077BP	4822 209 10223
7404	N74LS123N	5322 209 85602
⚠ 7405	BC558	5322 130 60068
7406	MC1391P	4822 209 72804
⚠ 7407	BC558	5322 130 60068
7408	BC639	4822 130 41053
7409	LSH16018-1	4822 130 62283
7410	PH2369	4822 130 41594
⚠ 7413	BC547	4822 130 44503
⚠ 7414	BC558	5322 130 60068
⚠ 7415	BC548	4822 130 44196
⚠ 7501	BC548	4822 130 44196
7502	TDA1675	4822 209 62369
7503	BC328	4822 130 44104
7504	BC338	4822 130 44121
⚠ 7505	BC557	4822 130 42231
⚠ 7506	BC557	4822 130 42231
⚠ 7507	BC548	4822 130 44196
7508	HEF4052BP	4822 209 10263
⚠ 7509	BC548	4822 130 44196
⚠ 7511	BC557	4822 130 42231
7512	BDT61	4822 130 60784
⚠ 7513	BC548	4822 130 44196
⚠ 7514	BC548	4822 130 44196
⚠ 7516	BC558	5322 130 60068
7801	HEF4538BP	5322 209 10422
7901	NE555N (7CM321/7CM329)	4822 209 80775
7902	BC548 (7CM321/7CM329)	4822 130 44196
7903	BC548 (7CM321/7CM329)	4822 130 44196
7904	BC548 (7CM321/7CM329)	4822 130 44196
7905	BC548 (7CM321/7CM329)	4822 130 44196
7906	BC548 (7CM321/7CM329)	4822 130 44196
7907	BC558 (7CM321/7CM329)	5322 130 60068
7908	BC548 (7CM321/7CM329)	4822 130 44196
7909	BC548 (7CM321/7CM329)	4822 130 44196
7910	BC548 (7CM321/7CM329)	4822 130 44196

SERVICE NOTES

TELEVISION SAFETY GUIDELINES FOR THE PROFESSIONAL SERVICE TECHNICIAN

Safety Checks

After the original service problem has been corrected, a complete safety check should be made. Be sure to check over the entire set, not just the areas where you have worked. Some previous servicer may have left an unsafe condition, which could be unknowingly passed on to your customer. Be sure to check all of the following:

Fire and Shock Hazard

1. Be sure all components are positioned in such a way as to avoid the possibility of adjacent component shorts. This is especially important on those chassis which are transported to and from the service shop.
2. Never release a repaired unit unless all protective devices such as insulators, barriers, covers, strain reliefs, and other hardware have been installed in accordance with the original design.
3. Soldering and wiring must be inspected to locate possible cold solder joints, solder splashes, sharp solder points, frayed leads, pinched leads, or damaged insulation (including the ac cord). Be certain to remove loose solder balls and all other loose foreign particles.
4. Check across-the-line components and other components for physical evidence of damage or deterioration and replace if necessary. Follow original layout, lead length, and dress.
5. No lead or component should touch a receiving tube or a resistor rated at 1 watt or more. Lead tension around protruding metal surfaces or edges must be avoided.
6. Critical components having special safety characteristics are identified with an ⚠ by the Ref. No. in the parts list and enclosed within a broken line* (where several critical components are grouped in one area) along with the safety symbol ⚠ on the schematic diagrams and /or exploded views.
7. When servicing any unit, always use a separate isolation transformer for the chassis. Failure to use a separate isolation transformer may expose you to possible shock hazard, and may cause damage to servicing instruments.
8. Many electronic products use a polarized ac line cord (one wide pin on the plug). Defeating this safety feature may create a potential hazard to the servicer and the user. Extension cords which do not incorporate the polarizing feature should never be used.
9. After reassembly of the unit, always perform an ac leakage test or resistance test from the line cord to all exposed metal parts of the cabinet. Also, check all metal control shafts (with knobs removed), antenna terminals, handles, screws, etc. to be sure the unit may be safely operated without danger of electrical shock .

* Broken line — • — • — • — • —

Implosion

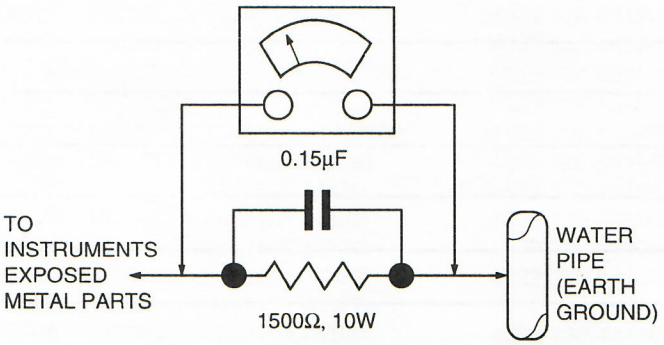
1. All picture tubes used In current model receivers are equipped with an integral implosion system. Care should always be used, and safety glasses worn, whenever handling any picture tube. Avoid scratching or otherwise damaging the picture tube during installation.
2. Use only replacement tubes specified by the manufacturer.

X-radiation

1. Be sure procedures and instructions to all your service personnel cover the subject of X-radiation. Potential sources of X-rays in TV receivers are the picture tube and the high voltage circuits. The basic precaution which must be exercised is to keep the high voltage at the factory recommended level.
2. To avoid possible exposure to X-radiation and electrical shock, only the manufacturer's specified anode connectors must be used.
3. It is essential that the service technician has an accurate HV meter available at all times. The calibration of this meter should be checked periodically against a reference standard.
4. When the HV circuitry is operating properly there is no possibility of an X-radiation problem. High voltage should always be kept at the manufacturer's rated value - no higher - for optimum performance. Every time a color set is serviced, the brightness should be run up and down while monitoring the HV with a meter to be certain that the HV is regulated correctly and does not exceed the specified value. We suggest that you and your technicians review test procedures so that HV and HV regulation are always checked as a standard servicing procedure, and the reason for this prudent routine is clearly understood by everyone. It is important to use an accurate and reliable HV meter. It is recommended that the HV reading be recorded on each customer's invoice, which will demonstrate a proper concern for the customer's safety.
5. When troubleshooting and making test measurements in a receiver with a problem of excessive high voltage, reduce the line voltage by means of a Variac to bring the HV into acceptable limits while troubleshooting. Do not operate the chassis longer than necessary to locate the cause of the excessive HV.
6. New picture tubes are specifically designed to withstand higher operating voltages without creating undesirable X-radiation. It is strongly recommended that any shop test fixture which is to be used with the new higher voltage chassis be equipped with one of the new type tubes designed for this service. Addition of a permanently connected HV meter to the shop test fixture is advisable. The CRT types used in these new sets should never be replaced with any other types, as this may result in excessive X-radiation.
7. It is essential to use the specified picture tube to avoid a possible X-radiation problem.
8. Most TV receivers contain some type of emergency "Hold Down" circuit to prevent HV from rising to excessive levels in the presence of a failure mode. These various circuits should be understood by all technicians servicing them, especially since many hold down circuits are inoperative as long as the receiver performs normally.

Leakage Current Cold Check

1. Unplug the ac line cord and connect a jumper between the two prongs of the plug.
2. Turn on the power switch.
3. Measure the resistance value between the jumpered ac plug and all exposed cabinet parts of the receiver, such as screw heads, antennas, and control shafts. When the exposed metallic part has a return path to the chassis, the reading should be between 1 megohm and 5.2 megohms. When the exposed metal does not have a return path to the chassis, the reading must be infinity. Remove the jumper from the ac line cord.



Leakage Current Hot Check

1. Do not use an isolation transformer for this test. Plug the completely reassembled receiver directly into the ac outlet.
2. Connect a 1.5k, 10W resistor paralleled by a 0.15uF. capacitor between each exposed metallic cabinet part and a good earth ground such as a water pipe, as shown above.
3. Use an ac voltmeter with at least 5000 ohms/ volt sensitivity to measure the potential across the resistor.
4. The potential at any point should not exceed 0.75 volts. A leakage current tester may be used to make this test; leakage current must not exceed 0.5milliamps. If a measurement is outside of the specified limits, there is a possibility of shock hazard. The receiver should be repaired and rechecked before returning it to the customer.
5. Repeat the above procedure with the ac plug reversed. (Note:An ac adapter is necessary when a polarized plug Is used. Do not defeat the polarizing feature of the plug.)

Picture Tube Replacement

The primary source of X-radiation in this television receiver is the picture tube. The picture tube utilized in this chassis is specially constructed to limit X-radiation emissions. For continued X-radiation protection, the replacement tube must be the same type as the original, including suffix letter, or a Philips approved type.

Parts Replacement

Many electrical and mechanical parts in Philips television sets have special safety related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. The use of a substitute part which does not have the same safety characteristics as the Philips recommended replacement part shown in this service manual may create shock, fire, or other hazards.